THE NEW
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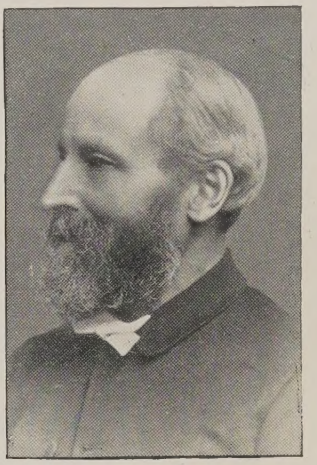
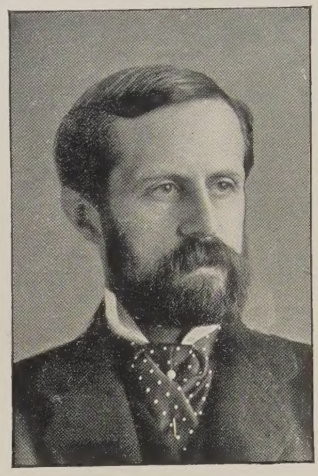
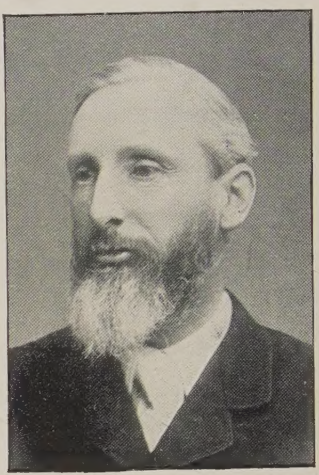


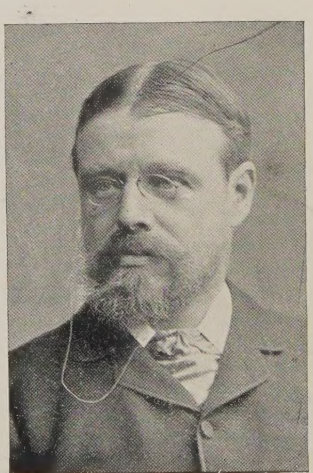
Rev. Edwin Abbott, D.D.



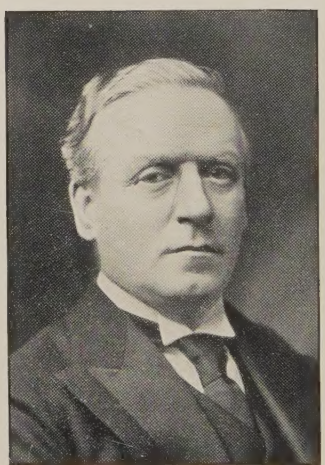
Earl of Aberdeen



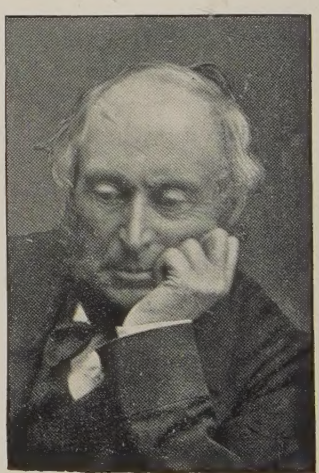
Grant Allen



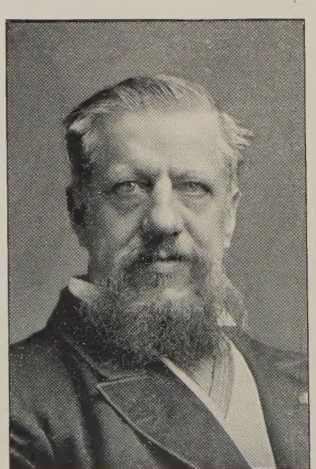
Sir L. Alma-Tadema, R.A.



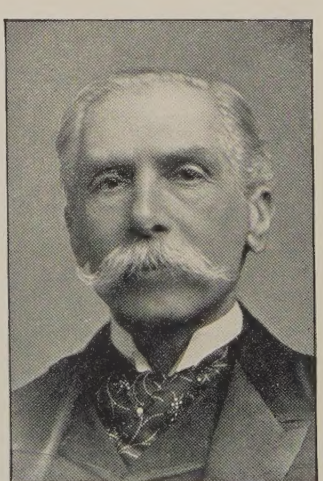
Right Hon. H. H. Asquith



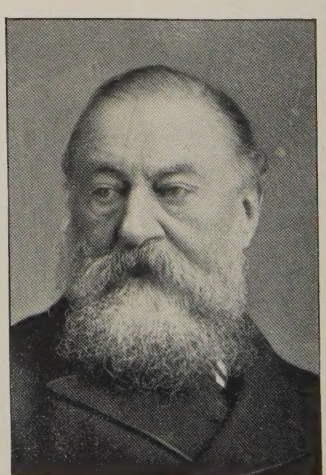
Lord Armstrong



Sir Edwin Arnold



Alfred Austin



Sir Samuel Baker

*** The portraits are from photographs by Messrs. Elliott & Fry, with the exception of Grant Allen (Russell & Sons), Sir L. Alma-Tadema (Ellis & Walery), and Lord Armstrong (W. & D. Downey).

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MANY SPECIALISTS

IN

THE VARIOUS BRANCHES OF HUMAN KNOWLEDGE

Volume I

LONDON

THE GRESHAM PUBLISHING COMPANY

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1911

LIST OF PLATES AND MAPS.

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SELECT PRONOUNCING LIST
OF ENTRIES IN VOL. I.

KEY: ā as in fate or in fare, ä as in far (sometimes short, sometimes long), a as in fat, ą as in fall; ē as in me, e as in met, ė as in her; ī as in pine, i as in pin; ō as in note, o as in not, ö as in move; ū as in tube, u as in tub, ų as in bull, ü, the French u (sometimes short, sometimes long); ou as in pound; ch as in chain; *h* as in Scotch loch, German nach; ṅ as in French ton; th as in thin; *th* as in this; w and y always consonants; zh as z in azure or j in French jaune.

Aa, ä
Aachen, ä′*h*en
Aalborg, ōl′bor*h*
Aalen, ä′len
Aar, är
Aarau, ä′rou
Aard-vark, ärd′värk
Aardwolf, ärd′wųlf
Aargau, är′gou
Aarhuus, ör′hös
Aasvär, ös′vär
Abaca, ab′a-ka
Abalone, ab-a-lō′ne
Abano, äb′ä-nō
Abauzit, ä-bō-zē
Abbadie, äb-ä-dē
Abbeville, äb-vēl
Abdera, ab-dē′ra
Abelard, ab′e-lärd
Abencerrages, ab-en-ser′a-jez
Abergavenny, ab-ėr-ge′ni
Abersychan, ab-ėr-sik′an
Aberystwith, ab-ėr-ist′with
Åbo, ō′bō
Abomey, a-bō′mi
Aboukir, ä-bö-kēr′
About, ä-bö
Abrantes, ä-brän′tās
Abruzzi, ä-bruṭ′sē
Abu, a-bö′
Abulfeda, ä-bųl′fe-dä
Abushehr, ä-bö-shär′
Abydos, a-bī′dos
Acalephæ, ak-a-lē′fē
Acapulco, äk-ä-pųl′kō
Acarus, ak′a-rus
Accipitres, ak-sip′i-trēz
Acciptrinæ, ak-sip-i-trī′nē
Acephala, a-sef′a-la
Acerra, ä-cher′rä
Achæans, a-kē′anz
Achæmenidæ, ak-ē-men′i-dē
Achalzich, ä-*h*äl′tsē*h*
Achard, a*h*′ärt
Achates, a-kā′tēz
Acheen, ä-chēn′
Achelous, ak-e-lō′us
Achene, a-kēn′
Acheron, ak′e-ron
Achill, ak′il
Achilles, a-kil′ēz
Achimenes, a-kim′e-nēz
Achor, ā′kor
Acierage, ä′sē-ėr-āj
Acireale, ä′chē-rā-ä′lā
Aconcagua, ä-kon-kä′gwä
Aconquija, ä-kon-kē′*h*ä
Acorus, ak′o-rus
Acqui, äk′wē
Actæon, ak-tē′on
Adagio, ä-dä′jō
Adal, ä-däl′
Adamawa, ad-a-mä′wä
Adamnan, a-dam′nan
Adana, ad′a-na
Adanson, ä-dän-sōṅ
Adel, ä-del′
Adelsberg, ä′dėlz-ber*h*
Adelung, ä′de-lųng
Adige, ä′dē-jä
Admetus, ad-mē′tus
Adobe, ä-dō′bā
Adonai, a-dō′nī
Adonis, a-do′nis
Adour, ä-dör
Adowa, a-dō′wä
Adramyti, ad′ra-mi-ti
Adule, ä-dö′lā
Æacus, ē′a-kus
Ædui, ē′dū-ī
Ægadean, ē-ga-dē′an
Ægæon, ē-jē′on
Ægean, ē-jē′an
Ægeus, ē′jūs
Ægina, ē-jī′na
Ægineta, ē-ji-nē′ta
Ægis, ē′jis
Ægle, ē′glē
Ælfric, alf′rik
Ælianus, ē-li-ā′nus
Æneas, ē-nē′as
Ænesidemus, ē-nes-i-dē′mus
Æolus, ē′o-lus
Æroe, är′ė-e
Æschines, es′ki-nēz
Æschylus, es′ki-lus
Æsculapius, es-kū-lā′pi-us
Æthusa, ē-thū′sa
Ætna, et′na
Affrique, äf-rēk
Afghanistan, äf-gän′i-stän
Agades, ag′a-des
Agallochum, a-gal′o-kum
Agamemnon, ag-a-mem′non
Agami, ag′a-mi
Aganippe, a-ga-nip′ē
Agape, ag′a-pē
Agapemone, ag-a-pem′o-nē
Agassiz, ag′a-sē
Agathocles, a-gath′o-klēz
Agave, a-gā′vē
Agde, ägd
Agen, ä-zha*ṅ*
Ageratum, a-jer′a-tum
Agesilaus, a-jes-i-lā′us
Aghrim, ą′grim
Agincourt, ä-zha*ṅ*-kör
Agis, ā′jis
Aglaia, a-glā′ya
Agnano, ä-nyä′nō
Agnesi, ä-nyä′sē
Agoult, ä-gö
Agouta, a-gö′ta
Agouti, a-gö′ti
Agram, äg′räm
Agricola, a-grik′o-la
Agrigentum, ag-ri-jen′tum
Agrippa, a-grip′pa
Agrippina, a-grip-pī′na
Agua, ä′gwä
Aguardiente, ä-gwär-dē-en′tā
Aguas Calientes, ä′gwäs kä-lē-en′tās
Agusseau, ä-ges-ō
Aguilar, ä-gē-lär′
Aguilas, ä-gē′läs
Agulhas, ä-gųl′yäs
Ahasuerus, ä-haz-ū-ē′rus
Ahmedabad, ä-med-ä′bäd
Ahriman, ä′ri-man
Aidin, ä-i-dēn′
Aigues Mortes, āg mort
Aiguille, ä′gwil
Aigun, ī-gųn′
Aimard, ā-mär
Ain, a*ṅ*
Ainmiller, īn′mil
Ainos, ī′nōz
Ain-Tab, īn-täb′
Aire-sur-la-Lys, ār-sür-lä-lē
Aisne, ān
Aivali, ä-i-vä′lē
Aix, āks [pel
Aix-la-Chapelle, āks-lä-shä-
Ajaccio, ä-yäch′ō
Akabah, ak-a-bä
Aken, ä′ken
Akerman, ä-ker-män′
Akhtirka, ä*h*-tir′kä
Akola, a-kō′la
Akron, ak′ron
Aksu, ak-sö′
Akyab, ak-yab′
Alabama, al-a-bä′ma
Alagoas, ä-lä-gō′äs
Alais, ä-lā
Alajuela, ä-lä-*h*ų-ā′lä
Aland, ō′länd
Alard, ä-lär
Alaric, al′a-rik
Ala-Shehr, ä-lä-shär′
Alatau, ä-lä-tou′
Alatri, ä-lä′trē
Alatyr, ä-lä-tir′
Alava, ä′lä-vä
Albacete, äl-bä-thä′tā
Albani, äl-bä′nē
Albay, äl-bī′
Albendorf, äl′ben-dorf
Alberoni, Giulio, jū′li-ō äl-bā-rō′nē
Albigenses, al-bi-jen′sēz
Albret, Jeanne d′, zhän däl-
Albuera, äl-bų-ā′rä [brā
Albufera, äl-bų-fā′rä
Albuñol, äl-bų-nyol′
Albuquerque, äl-bų-kerk′ā
Alcæus, al-sē′us
Alcalá de Guadaira, äl-kä-lä′ dā gwä-dī′rä — de Henares, dā en-ä′res — la Real, lä rä-äl′
Alcalde, äl-käl-dā
Alcamo, äl′kä-mō
Alcantara, äl-kän′tä-rä
Alcazar, äl-kä′thär′
Alceste, al-ses′te
Alcibiades, al-si-bī′a-dēz
Alcinous, al-sin′o-us
Alcira, äl-thē′rä
Alcmena, alk-mē′na
Alcobaça, äl-kō-bä′sä
Alcuin, alk′win
Aldebaran, al-deb′ar-an
Alderney, äl′dėr-ni
Aldershot, ąl′dėr-shot
Aldhelm, ald′helm
Aleman, ä-le-män′
Alembert, ä-läṅ-bär
Alemtejo, ä-läṅ-tā′zhō
Alençon, ä-läṅ-sōṅ
Aleutian, a-lū′shan
Alexandropol, al-eks-an-drō′-
Alfarabi, al-fa-rä′bi [pol
Alfieri, äl-fi-ā′rē
Alfreton, al′fėr-ton
Algæ, al′jē
Algarve, äl-gär′vä
Algazzali, al-gaz-ä′lē
Algeciras, äl-*h*e-thē′räs
Alghero, äl-gā′rō
Algiers, al′jērz
Algoa, al-gō′a
Alguazil, äl-gwä-thēl′
Alhama, ä-lä′mä
Ali, ä′lē
Alicante, ä-lē-kän′tā
Alicata, ä-lē-kä′tä
Aligarh, a-lē-gur′
Aliwal, a-li-wal′
Alizarine, a-liz′a-rin
Alkermes, al-ker′mes
Alkmaar, älk-mär′
Alla breve, äl′lä brā′vā
Allahabad, al-la-ha-bäd′
Alleghany, al-le-gā′ni
Allegri, äl-lā′grē
Allegro, äl-lā′grō
Alleine, al′en
Allenstein, äl′en-stīn
Alleyn, al′en
Allier, äl-li-ā
Alloa, al′lo-a
Allobroges, al-lo′bro-jēz
Almada, al-mä′dä
Almaden, äl-mä-den′
Almagro, äl-mä′grō
Almalee, äl-mä-lē′
Almamun, äl-mä-mön′
Almeida, äl-mā′i-dä
Almeria, äl-mä-rē′ä
Almondbury, ä′mund-be-ri
Almora, äl-mō′rä
Alnwick, an′ik
Alopecurus, a-lop-e-ku′rus
Alost, ä′lost
Alpes, Basses-, bäs-älp
Alpes, Hautes-, ōt-älp
Alpes-Maritimes, älp-mä-ri-
Alpheus, al-fē′us [tēm
Alpini, al-pē′nē
Alpujarras, äl-pö-*h*är′räs
Alsace, äl-säs
Al Segno, äl sän′yō
Altai, äl′tī
Altamura, äl-tä-mö′rä
Altena, äl′te-nä
Altenburg, äl′ten-bų*r*h
Althæa, äl-thē′ä
Altona, äl′to-nä
Altoona, al-tö′na
Alto Rilievo, äl′tō rē-lē-ā′vō
Altranstädt, ält′rän-stet
Altwasser, ält′väs-ėr
Alumbagh, a-lum-bäg′
Alvarado, äl-vä-rä′dō
Alvarez, äl-vä-reth′
Amadeus, am-a-dē′us
Amadis, am′a-dis
Amadou, am′a-dö
Amalthæa, a-mal-thē′a
Amarapura, a-ma-ra-pö′ra
Amasia, ä-mä-sē′ä
Amasis, a-mā′sis
Amati, ä-mä′tē
Amaxichi, ä-mäks′ē-*h*ē
Ambleteuse, äṅ-bl-tėz
Amboise, äṅ-bwäz
Ameland, ä′me-länt
Amélie-les-Bains, ä-mā-lē-lā-baṅ
Amerigo Vespucci, ä-mer-ē′gō ves-puṭ′chē
Amersfoort, ä′merz-fört
Amhara, äm-hä′rä
Amherst, am′ėrst
Amice, am′is
Amiel, ä-mē-el
Amiens, ä-mē-aṅ
Amirante, ä-mē-rän′tā
Ammanati, äm-mä-nä′tē
Ammergau, äm′er-gou
Amomum, a-mō′mum
Ampère, äṅ-pār
Amphiaraus, am-fi-a-rā′us
Amphion, am-fī′on
Amphitrite, am-fi-trī′tē
Amphitryon, am-fit′ri-on

Amphora, am'fo-ra
Amritsir, am'rit-sēr
Amurath, am'u-rath
Amyridaceæ, a-mi-ri-dā'sē-ē
Anabas, an'a-bas
Anabasis, a-nab'a-sis
Anableps, an'a-bleps
Anacharis, a-nak'a-ris
Anacharsis, an-a-kar'sis
Anacreon, a-nak'rē-on
Anadyomene, an-a-di-om'e-nē
Anadyr, ä-nä'dēr
Anæmia, a-nē'mi-a
Anagni, ä-nän'yē
Anahuac, ä-nä-wäk'
Anakim, an'a-kim
Anam, a-nam'
Ananas, an'a-nas
Anapa, än-ä-pä'
Anaxagoras, an-aks-ag'o-ras
Anaximander, a-naks'i-man-dēr
Anaximenes, an-aks-im'e-nēz
Anbury, an'be-ri
Ancelot, äⁿs-lō
Anchises, an-kī'sēz
Anchusa, an-kū'sa
Ancillon, äⁿ-sē-yōⁿ
Ancre, än-kr
Andante, an-dan'tā
Andelys, Les, lāz äⁿd-lēz
Andenne, äⁿ-den
Andernach, än'der-näh
Andes, an'dēz
Andocides, an-dos'i-dēz
Andrassy, än-drä'shē
André, äⁿ-drā
Andreæ, än'dre-ā
Andromachē, an-drom'a-kē
Andromeda, an-drom'e-da
Andronicus, an-dro-nī'kus
Andujar, än-dö-här'
Anegada, a-ne-gä'da
Angara, än-gä-rä'
Angelico, an-jel'i-kō
Angelo, an'je-lō
Ångermann, ong'er-män
Angermünde, äng'er-mün-de
Angers, än-zhā
Angerstein, äng'er-stīn
Angevins, an'je-vinz
Anglesey, ang'gl-sē
Angola, än-gō'lä
Angora, än-gō'rä
Angostura, än-gos-tö'rä
Anguilême, äⁿ-gö-läm
Angra Pequena, äng'grä pe-
Anguilla, an-gwil'la [kä'nä
Aniche, ä-nēsh
Anime, an'i-me
Animuccia, ä-nē-mu̯t'chä
Anjou, äⁿ-zhö
Ankarström, än'kär-strēm
Ankobar, an-kō'bar
Annam, an-nam'
Annamaboe, an-a-ma-bō
Annapolis, an-nap'o-lis
Annecy, än-sē
Anonaceæ, an-o-nā'sē-ē
Anoplotherium, an-o-plo-thē'-ri-um
Anquetil Du Perron, äⁿk-tēl dü pā-roⁿ
Anspach, än'späh
Anstruther, an'stru*th*-ėr or
Antæus, an-tē'us [an'stėr
Antananarivo, än-tän-än-ä-rē'vō
Antequera, än-te-kā'rä
Anteros, an'te-ros
Antibes, äⁿ-tēb
Anticyra, an-tis'i-ra
Antietam, an-tē'tam
Antigone, an-tig'o-nē
Antigonish, an-tig'o-nish
Antigonus, an-tig'o-nus
Antigua, an-tē'ga
Antilles, an-til'ez
Antimachus, an-tim'a-kus
Antinous, an-tin'o-us
Antioch, an'ti-ok
Antiochus, an-tī'o-kus
Antioquia, än-tē-ō-kē'ä
Antiparos, an-ti'pa-ros
Antipater, an-ti'pa-ter
Antipodes, an-ti'po-dēz
Antirrhinum, an-ti-rī'num
Antisthenes, an-tis'the-nēz
Antivari, än-tē'vä-rē
Antoinette, än-twä-net
Antommarchi, än-tom-mär'-
Antoninus, an-tō-nī'nus [kē
Anubis, a-nū'bis
Anupshahr, ä-nōp'shär
Anville, Jean Baptiste Bourguignon d', jäⁿ bäp-tēst bör-gē-nyōⁿ däⁿ-vēl
Anzin, äⁿ-zaⁿ
Aosta, ä-os'tä
Aoudad, a-ö'dad
Apaches, a-pä'chez
Apeldoorn, ä'pel-dōrn
Apelles, a-pel'ēz
Apenrade, ä'pen-rä-de
Aphrodite, af-ro-dī'tē
Aphthæ, af'thē
Apicius, a-pi'shi-us
Apion, ä'pi-on
Apocynaceæ, a-po-si-nā'sē-ē
Apogee, ap'o-jē
Apollonius, ap-ol-lō'ni-us
Apophthegm, ap'o-them
Appalachian, ap-pa-lā'chi-an
Appalachicola, ap-pa-la-chi-kō'la
Appenzell, äp'pen-tsel
Appoggiato, äp-po-jä'to
Appoggiatura, äp-po-jä-tö'rä
Apries, ä'pri-ēz
A priori, ā pri-ō'rī
Apsides, ap'si-dēz or ap-sī'dēz
Apt, ät
Aptera, ap'te-ra
Apuleius, ap-ū-lē'us
Apure, ä-pö'rā
Apurimac, ä-pö-rē-mäk'
Aquila, äk'wē-lä
Aquileia, ak-wi-lē'a
Aquinas, a-kwī'nas
Arabgir, ä-räb-gēr'
Aracacha, ar-a-kä'cha
Aracan, ar-a-kan'
Arachis, ar'a-kis
Arachnida, a-rak'ni-da
Arago, är-ä-gō
Araguaya, ä-rä-gwī'ä
Aranjuez, ä-rän-hu-eth'
Arany, a-ron'y
Arapaima, a-ra-pī'ma
Aratus, a-rā'tus
Arbela, ar-bē'la
Arbroath, är-brōth'
Arbutus, är'bū-tus
Arcachon, är-kä-shōⁿ
Arcesilaus, är-ses-i-lā'us
Archæopteryx, är-kē-op'te-
Archangel, ärk'äⁿ'jel [riks
Archelaus, är-kē-lā'us
Archil, är'kil
Archilochus, är-kil'o-kus
Archimedes, är-ki-mē'dēz
Archons, är'konz
Archytas, är-kī'tas
Arcis-sur-Aube, är-sē-sür-ōb
Arcole, är'ko-lā
Arçon, är-sōⁿ
Arcona, är-kō'nä
Arcturus, ärk-tū'rus
Ardeche, är-dāsh
Ardee, är-dē'
Ardennes, är-den'
Ardnamurchan, ärd-na-mur'-
Ardoch, är'doh [kan
Ardrossan, är-dros'san
Are, är
Arendal, ä'ren-däl
Areopagus, ā-re-op'a-gus
Arequipa, ä-rā-kē'pä
Ares, ā'rēz
Arethusa, a-re-thū'sa
Aretino, ä-rā-tē'nō
Arezzo, ä-ret'sō
Argaum, är-gä'um
Argemone, är-jem'o-nē
Argentan, är-zhäⁿ-täⁿ
Argenteuil, är-zhäⁿ-tė-yė
Argentine, är'jen-tīn
Argives, är'jīvz
Argolis, är'go-lis
Argostoli, är-gos'to-lē
Arguim, är'gwim
Argyle, är-gīl'
Argyro-Castro, är'gi-rō-käs'-
Ariadne, a-ri-ad'nē [trō
Arica, ä-rē'kä
Ariège, ä-rē-āzh
Aries, ā'ri-ēz
Arimanes, a-ri-mā'nēz
Arion, a-rī'on
Aristæus, a-ris-tē'us
Aristarchus, a-ris-tär'kus
Aristeas, a-ris'tē-as
Aristides, a-ris-tī'dēz
Aristobulus, a-ris-tō-bū'lus
Aristogeiton, ar-is-tō-gī'ton
Aristophanes, a-ris-tof'a-nēz
Aristotle, a'ris-tot-l
Aristoxenus, a-ris-tok'se-nus
Arizona, a-ri-zō'na
Arkansas, är'kan-sa or är-
Arlberg, ärl'berh [kan'sas
Arles, ärl
Armagh, är-mä'
Armagnac, är-mä-nyäk
Armentières, är-mäⁿ-tyār
Armida, är-mē'dä
Arnaud, är-nō
Arnauld, är-nō
Arndt, ärnt
Arne, ärn
Arnott, är'not
Arnsberg, ärnz'berh
Arnstadt, ärn'stät
Arnswalde, ärnz'väl-dė
Arok-Szallas, ä'rok-sä'läsh
Arpeggio, är-ped'jō
Arpino, är-pē'nō
Arracacha, ar-ra-kä'cha
Arracan, ar-ra-kan'
Arras, ä-rä
Arrondissement, ä-rōⁿ-dēs-
Arsaces, är'sa-sēz [mäⁿ
Arsamas, är'sa-mas
Arsinoë, är-sin'o-ē
Artaxerxes, är-tak-serk'sēz
Artedi, är-tā'dē
Artemis, är'te-mis
Arteveld, är'te-velt
Artevelde, är'te-vel-de
Artois, är-twä
Aruba, ä-rō'bä
Arundel, a'run-del
Aruspices, a-rus'pi-sēz
Aryan, a'ri-an
Asarum, as'a-rum
Asch, äsh
Aschaffenburg, ä-shäf'en-
Ascham, as'kam [bör*h*
Aschersleben, äsh'ėrz-lā-ben
Asclepiades, as-klē'pi-a-dēz
Ascoli, as'ko-lē
Ashantee, ash-an-tē'
Ashbourne, ash'bōrn
Ashby-de-la-Zouch, ash'bi-del a-zöch'
Asmannshausen, äs'mänz-hou-zn
Asmodai, as-mō'dā
Asmonæans, as-mō-nē'anz
Asopus, a-sō'pus
Asrael, as'ra-el
Assai, as-ī'
Assam, as-sam'
Assaye, as-sī'
Assignats, ä-sē-nyä
Assisi, äs-sī'sē
Assouan, äs-sö-än'
Astarte, as-tär'te
Astrakhan, äs-trä-hän'
Asuncion, ä-sun-thē-on'
Asymptote, as'im-tōt
Atacama, ä-tä-kä'mä
Atahualpa, ä-tä-wäl'pä
Atalanta, at-a-lan'ta
Atbara, at-bä'rä
Atchafalaya, ach-a-fa-lā'ya
Atcheen, ä-chēn'
Ate, ā'tē
Ateliers Nationaux, ä-tl-yā
Ath, ät [nä-syo-nō
Athaliah, ath-a-lī'ä
Athamas, ath'a-mas
Athelney, ath'el-ni
Athena, a-thē'na
Athenæus, ath-e-nē'us
Athenagoras, ath-e-nag'o-ras
Athlone, ath-lōn'
Athos, ā'thos
Athy, a-thī'
Atlantides, at-lan'ti-dēz
Atrato, ä-trä'tō
Atrebates, a-treb'a-tēz
Atreus, at'rūs
Atrides, a-trī'dēz
Atropa, at'ro-pa
Atropine, at'ro-pin
Atropos, at'ro-pos
Attaché, at'a-shā
Atys, at'is
Aubaine, Droit d', drwä
Auber, ō-bār [dō-bān
Aubervilliers, ō-bār-vēl-yā
Aubigné, ō-bėn-yā
Aubusson, ō-bü-sōⁿ
Auch, ōsh
Audebert, ōd-bār
Audubon, ą'du-bon
Auerbach, ou'ėr-bäh
Auerstädt, ou'ėr-stet
Augeas, ą-jē'as
Augereau, ōzh-rō
Augite, ą'jīt
Augsburg, ougz'bu̯rh
Augustine, ą-gus'tin or ą'gus-tin
Augustulus, a-gus'tū-lus
Aullagas, ou-lyä'gäs
Aumale, ō-mäl
Aunoy, ō-nwä
Aurengzebe, ą'reng-zēb
Auriga, ą-rī'ga
Aurillac, ō-rē-yäk
Autun, ō-tüⁿ
Auvergne, ō-vār-nyė
Auxerre, ō-sār
Auxonne, ō-son
Avatar, av-a-tär'
Avebury, āv'be-ri
Aveiro, ä-vā'i-ru
Avellino, ä-vel-lē'nō
Averroes, a-ver'o-es
Aveyron, ä-vā-rōⁿ
Avignon, ä-vē-nyōⁿ
Avila, ä'vē-lä
Avranches, ä-vräⁿsh
Axholme, aks'öm
Ayacucho, ä-yä-kö'chō
Ayala, ä-yä'lä
Ayamonte, ä-yä-mon'tä
Aye-aye, ī-ī
Ayesha, a-yesh'a
Aymaras, ī'mä-räz
Aytoun, ā'tun
Azerbijan, ä-zer-bī-jän'
Azores, a-zōrz' or a-zō'res

B

Babadagh, bä-bä-däg'
Babeuf, bä-bėf
Babour, bä'bu̯r
Babyroussa, bab-i-rus'a
Bacchylides, bak-kil'i-dēz
Bacciocchi, bät-chok'ē
Baccio della Porta, bät'chō
Bach, bäh
Bacharach, bäh'ä-räh
Bachaumont, bä-shō-mōⁿ
Bachmut, bäh-möt'
Backhuysen, bäk'hoi-zn
Badajoz, bä-dä-hōth'
Badalona, bä-dä-lō'na
Baden, bä'den
Badenoch, bad'-e-noh
Baena, bä-ā'nä
Baert, bärt
Baeza, bä-ā'thä
Bagdad, bag-dad'
Bagehot, bāj'ot
Bagirmi, ba-gir'mē
Bagnères de Bigorre, bän-yār dė bē-gorr — de Luchon, dė lü-shōⁿ
Bagni, bän'yē
Bahama, ba-hā'ma
Bahar, ba-här'
Bahia, bä-ē'ä
Bahraich, bä-rāch'
Bahrdt, bärt
Bahrein, bä'rīn
Baiæ, bī'ē
Baikal, bī'kal
Bailleul, bä-yėl
Bailly, bä-yē
Bairam, bī'ram
Baireuth, bī'roit
Bajazet, ba-ya-zet'

THE NEW
POPULAR ENCYCLOPEDIA

A DICTIONARY OF GENERAL KNOWLEDGE

A, the first letter in the English and other alphabets ultimately derived from the Phœnician, is traced by some to a character belonging to the Egyptian hieratic alphabet. *Alpha*, the Greek name of the letter, corresponds closely to *aleph* ('an ox'), the Phœnician name. (See ALPHABET.) The form which it has as a capital is the earliest—that as a 'small' or 'lower-case' letter being developed from this. The sound which originally belonged to it, and which is still its characteristic sound except in English, is that heard in *far, father, palm*, &c. This may be regarded as the simplest and easiest of all sounds to produce, the mouth being merely opened, without being either contracted or extended, and neither the back nor the front of the tongue being raised, as in the utterance of any of the other vowels. The above sound of *a* is the sound with which children generally begin to articulate. Though one of the simplest, it is at the same time one of the most perfect and melodious of sounds, and its sweetness and capability of expansion make it a favourite sound of singers. Various modern languages, as French, Italian, Spanish, &c., have only one sound for *a*, namely, the *ah*-sound, pronounced short or long. In the Teutonic languages it may be varied in pronunciation by the use of diacritical marks, as in the German *ä*, Swedish *å*, &c. In English, owing to the composite nature of the language and the numerous striking changes it has undergone, this character now represents as many as seven or eight sounds, as in the words *father, ask, mat, mate, mare, many, ball, what*. It is very common in the digraph *ea*, which is pronounced differently in different words; compare *seat* with *break, tea* with *yea*. The last two words are among the few in which it appears as a final letter in English, others being *sea, pea, flea, lea*. It also appears in the compound character *æ*, which was very common in Anglo-Saxon, but now occurs only in words that still retain more or less of a Latin or Greek form.—A, in music, is the sixth note in the diatonic scale of C, and stands when in perfect tune to the latter note in the ratio of $\frac{5}{3}$ to 1. (See MUSIC.) The open or unstopped second string of the violin gives this note.—For the use of the letter in abbreviations see the article ABBREVIATIONS.

A 1, the character attached to vessels of the highest class in Lloyd's Register of Shipping. A refers to the hull of the vessel, while 1 intimates the sufficiency of the rigging and whole equipment. This rank is assigned to new ships for a certain term of years, the length of which depends on the quality of the materials employed and the mode of building; but in order to retain their class the vessels must be subjected to periodical survey. Iron (or steel) ships are classed A 1 with a numeral (100, 90, 80) prefixed. The character A in red denotes the second, and Æ in black the third class of vessels. In all cases the 1 is omitted if the rigging and equipments are deficient. —The colloquial use of A 1 as denoting excellence is familiar to all.

AA, the name of a large number of rivers in the northern, western, and central countries of Europe, among the chief of which is a river of France that rises in the department of Pas-de-Calais, flows into that of the Nord, and reaches the Strait of Dover near Gravelines. It is about 50 miles long, and is navigable below St. Omer. Canals connect it with Calais and Dunkirk.

AACHEN. See AIX-LA-CHAPELLE.

AALBORG, a seaport of Denmark, on the south side of the Liimfiord. It was an important commercial town as far back as the eleventh century, is the see of a bishop, and has two old churches, an old castle, &c. The manufactures include leather, soap, spirits, &c., and it has a considerable trade by sea. Pop. in 1890, 19,503; in 1906, 31,509.

AALESUND, a seaport town and fishing centre on the west coast of Norway, on a small island, in about lat. 62° 30′ N., founded in 1824. It was nearly destroyed by fire in Jan., 1904. Pop. (1900), 11,672.

AAR, or AARE, a Swiss river, a tributary of the Rhine, being, next to it and the Rhone, the longest river in Switzerland. It is formed by torrents from two vast glaciers of the Bernese Alps in the eastern part of the canton of Bern, flows north-west through the romantic valley of Hasli, expands into the lakes of Brienz and Thun, becomes navigable, passes Bern, turns first north and then north-east, passes Solothurn and Aarau, and after giving its name to the canton of Aargau falls into the Rhine; total course, about 180 miles. The Oberaar and Unteraar glaciers, which give rise to the river, are among the most celebrated in Switzerland, and are connected with the names of Agassiz and other scientists. By its tributary the Lütschine it also receives supplies of water from the two Grindelwald glaciers.

AARAU, a town in Switzerland, capital of the canton of Aargau, on the river Aar, here crossed by a chain bridge. It is a handsome town, picturesquely situated, with fine public buildings, important educational institutions, cantonal library of 60,000 vols., &c. It manufactures silks, cottons, &c., and has a bell and cannon foundry. Pop. (1900), 7995.

AARD-VARK (that is, 'earth-pig'), a burrowing insect-eating animal of the order Edentata found in South Africa. It is the *Orycteropus Capensis* of naturalists, and has several other popular names, such as *Cape Pig* and *Ant-bear*. The name 'pig' is given to it from the shape of its snout. See ORYCTEROPUS.

AARDWOLF (*Proteles cristatus*), a carnivorous animal occupying a position intermediate between the Hyænas and Civets, and occurring in South Africa. Its average length is about 3½ feet, its colour being gray with a yellowish tinge. The sides are marked with darker bands, the paws being black. The name *aardwolf* means 'earthwolf', and is due to the habit which these animals have of burrowing in the earth. Their food consists of carrion and small mammals, but they appear also to subsist on a variety of substances, including insects, &c.

AARGAU, or ARGOVIE, a northern canton of Switzerland, bounded on the north by the Rhine, which separates it from the Grand-duchy of Baden, elsewhere by the cantons Zürich, Zug, Lucerne, Bern, Solothurn, and Basel; area, 543 square miles. It is hilly, being composed chiefly of spurs of the Alps and Jura, but has no mountains more than 3000 feet above sea-level. There are numerous fertile valleys, watered by the Aar and its many tributaries from the right, the Limmat and Reuss being the largest. The climate is moist and variable, and agriculture is in an advanced state. Timber is abundant. Fruit and vegetables abound, and vineyards are numerous, but the wines are of inferior quality. Cattle rearing is pursued with success. Cottons, silks, ribbons, linens, straw-plait, hosiery, &c., are made, and there are important machine works. A considerable number of people find employment in the boat traffic on the Aar and Rhine, and in the transit trade, which is carried on actively both by land and by water. Aargau formed part of the canton Bern till the year 1798. Its constitution was first fixed by the Congress of Vienna in 1815. The present constitution is purely democratic. The legislative power is vested in the great council, the members of which are chosen one for every 1100 inhabitants. It has to submit its laws and decrees to the popular vote (referendum). The executive power is vested in the small council of seven members elected by and from the great council. Pop. (1907), 213,582, of whom more than half are Protestants. The language almost universally spoken is German. The capital is Aarau.

AARHUUS, a seaport of Denmark, on the east coast of Jutland, on a bay of the Cattegat. It is well built, the chief edifice being a Gothic cathedral (begun in 1201), which is one of the largest and finest ecclesiastical structures in the kingdom. It has a cathedral school and a museum. It carries on shipbuilding, iron-founding, the cotton manufacture, and other industries. There is a good harbour, and a considerable trade in grain, cattle, foreign goods, &c. Pop. in 1890, 33,308; in 1906, 55,193.

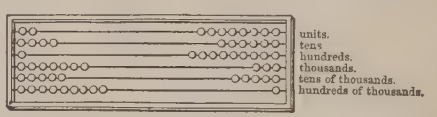
AARON, of the tribe of Levi, eldest son of Amram and Jochebed, and brother of Moses. When, at the burning bush, Moses received his divine commission to deliver the Israelites from Egyptian bondage, Aaron, because of his talents as a speaker, was appointed his assistant. At Mount Sinai, when the people became impatient at the long-continued absence of Moses, he complied with their request in making a golden calf, probably in imitation of the Egyptian god Apis; and thus became involved with them in the guilt of gross idolatry. By the Mosaic law the office of high-priest, which he first filled, was made hereditary in his family. He died at Mount Hor, on the borders of Idumea, at the age of 123, and was succeeded by his son Eleazar.

AARON'S BEARD, a popular name for several plants, especially *Hypericum calycinum*, the largest flowered of the St. John's-worts, order Hypericaceæ. It is a native of south-eastern Europe, and receives its popular name from the appearance of its bunches of prominent stamens.

AARON'S ROD, in architecture, the name of an ornament consisting of a rod with leaves sprouting from it; and also of a rod with a serpent twined round it. A *caduceus* has two serpents twining round it.—The name is also popularly given to certain plants, as the golden-rod and mullein.

ABACA, or MANILLA HEMP, a strong fibre yielded by the leaf-stalks of a certain kind of plantain or banana (*Musa textilis*) which grows abundantly in the islands of the Indian Archipelago, and is extensively cultivated in the Philippines. The outer fibres of the leaf-stalks are the strongest, and are made into strong and durable ropes, while the inner are made into linens and other fine fabrics.

ABACUS (Latin) primarily designated any table of a square or rectangular form; and hence was applied to a table covered with sand or dust, on which mathematicians drew their diagrams, an instrument probably not unlike a modern backgammon-board for playing with dice and counters, and a kind of calculating machine for facilitating arithmetical operations. This last is still used in elementary schools. It consists of a number of parallel cords or wires running either vertically or horizontally, upon each of which ten balls or beads are strung, the upper or right-hand wire being appropriated to units, the next to tens, &c. The balls on the left side in the accompanying woodcut are spare ones; those on the right side represent the number 153,968. The operations of addition and subtraction can be readily performed on the abacus in precisely the same way as we do them on paper, and indeed it was formerly used in many countries, and is still in parts of Russia and Asia, in actual everyday calculation. In most European nations, however, it is relegated to the infant-rooms of schools, where it is known as the *ball-frame*.—In architecture *abacus* is applied variously; but seems to have been at first confined to the square or oblong tablet on the top of a column and supporting the entablature.



ABADDON, a Hebrew word equivalent to the Greek Apollyon, and meaning destroyer. It is used in Rev. ix. 11 as the name of the angel of the bottomless pit, king of the 'locusts' described in verses 3–10 of the chapter referred to.

ABÆ, a small town of ancient Greece, in Phocis, with a sanctuary and famous oracle of Apollo. Scanty ruins of it still remain.

ABALONE, a name in California and elsewhere for a species of ear-shell (genus Haliotis), which furnishes mother-of-pearl.

ABANDONMENT, a term of marine insurance, employed to designate the case where the party insured gives up his whole interest in the property to the insurer, and claims as for a total loss.

ABANO, a village of North Italy, 5 miles south-west of Padua, famous for its mud baths and thermal springs (the Aponi Fons or Aquæ Patavinæ of the Romans). Pop. 800.

ABANO, PIETRO D', known also as *Petrus de Apono*, one of the most celebrated physicians of the thirteenth century, was born in the Italian village (see above) from which he takes his name, in 1246 or 1250. He visited the East in order to acquire a thorough knowledge of Greek, and then completed his studies at the University of Paris. Returning to Italy he settled at Padua, where his reputation as a physician became so great, that his rivals, envious of his fame,

gave out that he was aided in his cures by evil spirits. It was known, too, that he practised astrology, and he was twice summoned before the Inquisition. On the first occasion he was acquitted, and he died before his second trial came to an end. Besides the work, Conciliator Differentiarum Philosophorum et præcipue Medicorum (Mantua, 1472), he wrote De Venenis eorumque Remediis (1472), Geomantia, Quæstiones de Febribus, and other works.

ABATEMENT, in law, has various significations. *Abatement of freehold* takes place where a person dies seized of the estate, and before the heir or devisee enters a third party (the abater) takes wrongful possession. The *abatement of nuisances* is the remedy allowed by law to a person injured by a public or private nuisance of himself destroying or removing it. He must not, however, commit a breach of the peace in doing so; and in the case of a private nuisance he must cause no damage beyond what the removal of the nuisance demands. A *plea in abatement* is brought forward by a defendant when he wishes to defeat or quash a particular action on some formal or technical ground. When this defence is successful on the trial the right of action still subsists, as the plea does not involve the merits by denying the cause of the action itself. Abatement in *mercantile law* is an allowance or discount made for prompt payment, or any similar deduction.

ABATTIS (French), in fortification, a collection of trees cut down and laid with their branches turned towards the enemy in such a way as to form a defence for troops stationed behind them.

ABATTOIR, a French term for a slaughter-house, also used in England and elsewhere since the establishment of the celebrated abattoirs of Paris, instituted by a decree of Napoleon in 1807, but not brought to a completion till 1818. Such public slaughter-houses are now to be found in or near many towns. See BUTCHERS.

ABAUZIT, FIRMIN, a learned French writer, born of Protestant parents at Uzés in Languedoc in 1679. He lost his father in infancy, and in his fifth year, after the revocation of the edict of Nantes, was forcibly placed at the College of Uzés, to be educated as a Roman Catholic, but his mother, in 1689, managed to send him off secretly to Geneva. He early gave proofs of remarkable talents; and after completing his education set out on his travels in 1698, visiting Holland, where he became intimate with Bayle, and thence passing over into England, where Newton treated him with marked attention, and King William III. sought to retain him by advantageous offers. He preferred to return to Geneva, where he spent the remainder of a long life devoted to study, and without any other office than that of honorary librarian. He died in 1767. His works, which are not numerous, scarcely justify the high name which he bore among his contemporaries, of whom Newton declared him worthy to arbitrate between himself and Leibnitz.

ABBA, a Semitic word equivalent to 'father', which being applied in the Eastern Church to monks, superiors of monks, and other ecclesiastics, gave rise to the word *abbot*. In the Syriac and Coptic churches it is given to the bishops.

ABBADIE, JACQUES, French Protestant writer and Dean of Killaloe, was born near Pau in 1654 (?), and died in London, 25th September, 1727. At an early age he took the degree of D.D. at Sedan, and about 1680 was called to Berlin as pastor to the French Protestants there. He acted as such for some eight years, during which time he published various sermons and addresses, and especially a treatise on the truth of the Christian religion that passed through many editions and was translated into several languages, including English. He was brought to England by Marshal Schomberg in 1688, and after the battle of the Boyne became minister of the French church in the Savoy. He next settled in Ireland, where he was appointed to the Deanery of Killaloe in 1699. While still holding this post he lived more than three years in Amsterdam, and latterly established himself in London. Other important works of his were La Vérité de la Réligion Chrétienne Réformée (1707) and Le Triomphe de la Providence et de la Réligion (1723).

ABBAS I., surnamed the *Great*, born in 1557, was the seventh shah or king of Persia of the dynasty of the Sufis. In his childhood he was sent to Khorassan as nominal governor, and at the age of twenty-five was proclaimed king by the discontented nobles of that province. His father, Mohammed Khodabendeh, under whose officers the country had suffered great oppression, was soon driven from the throne, and Abbas obtained the sovereignty at a time when the Turks had invaded the western provinces of the kingdom, and hordes of Usbeck Tartars made repeated incursions into Khorassan. By the energy of the new monarch internal tranquillity was soon restored. His first act was to transfer his residence from Kasbin to Ispahan. He then concluded a treaty with the Turks, to whom he ceded and confirmed all their conquests, with the view of gaining time to chastise the Usbecks. In 1597 he surprised and completely defeated these Tartar plunderers in a battle which was fought in the neighbourhood of Herat. Then followed the conquest of Ghilan, Mazanderan, several parts of Tartary, and almost the whole of Afghanistan. Abbas, whose troops had been disciplined under the supervision of English officers, then declared war against the Turks, and in 1605, with an army of 60,000 men, he defeated a Turkish army of nearly twice that number in a battle which was fought near Bussorah. By this victory he recovered all his lost provinces, and secured a complete immunity from Turkish aggression during the rest of his lifetime. He also subdued a vast extent of country to the west of the Tigris and Euphrates, which had previously acknowledged the sovereignty of the Porte, and in 1611 he dictated to Achmet I. the conditions of a treaty of peace which secured to Persia the possession of Shirvan and Kurdistan. His fame now extended throughout the world. At his splendid court were ambassadors from the Great Mogul, from Russia, England, Spain, Portugal, and Holland. He also cultivated a correspondence with the pope as the natural enemy of the Turks, and always manifested a special regard for Christians. He greatly embellished Ispahan, and constructed some public works on a scale of imperial magnificence. But his character, though distinguished by princely qualities, was sullied by great crimes, the most unnatural of which was the murder of Sefi Mirza, his eldest son. He died suddenly on the night of the 27th January, 1628, having reigned over Persia forty-one years.

ABBAS MIRZA, heir-presumptive of the Persian throne, was born in 1785 and died in 1833. He was third son of Feth Ali, who desired that he and not his elder brothers should succeed him on the throne, and in order to prepare him for his position he appointed him governor of the province of Azerbijan. When Napoleon marched into Russia with his great army Abbas co-operated with him by attacking the Russians in the south; but he met with no greater success than the French generals, being defeated and routed in a pitched battle. He made peace with Russia at Gulistan and assisted the Russians

against the Turks; but a later war between Persia and its old enemy resulted in another victory and a large accession of new territory for Russia. From about 1828 Abbas Mirza devoted himself to military reform in his kingdom, but his claim to the throne, which Russia had recognized, had never to be pressed, as he died before his father in 1833.

ABBASSIDES, the name of a dynasty which traced its descent from Abbas (born 566, died 652), uncle of Mohammed, and furnished thirty-seven caliphs to Bagdad between 749 and 1258. Many of the descendants of the Abbassides still live in Turkey and India. (See CALIPHS.) This dynasty supplanted that of the Ommiades. The name of Abbassides is also sometimes applied to a Persian dynasty which kept possession of the throne from 1540 to 1736. Its members traced their descent from the caliph Ali, but were more immediately descended from the Sufis. The most celebrated sovereign of the dynasty was Abbas the Great (see that article).

ABBATE, NICCOLO DELL', Italian fresco painter, who was born at Modena in 1512, studied under Raphael and Correggio, and left some fine monuments of his genius at Modena and Bologna. He went to France in 1552, where he painted the Ulysses Gallery of Fontainebleau: with the exception of the tableaux representing the history of Alexander the Great, these frescoes were all destroyed when the castle was enlarged in 1738. Many other frescoes painted in various buildings in France and Italy have also been destroyed in the course of structural alterations. He painted a few pictures in oil, of which one, a Rape of Proserpine, is in the Duke of Sutherland's collection. He died in 1571.

ABBÉ, the French word for abbot, was, before the French revolution, the common title of all who had studied theology either with a view to become ordained clergymen, or merely in the hope of obtaining some appointment or benefice, to which such study was considered a preliminary requisite. 'Young men of noble families were nominated to abbeys, and could enjoy their revenues, long before they could take priests' orders; they were not bound to residence; and under Louis XIV. and Louis XV. many of these *abbés commendataires* never saw the abbeys of which they were the titular rulers.' These were really entitled to be called abbés, but the name was also given to mere aspirants to benefices. Marked out by their clerical dress, abbés were seen everywhere, and in private families they often acted as tutors, literary friends, confidential advisers, &c. Young clerics, or those holding no special appointment, are still so designated. See ABBOT.

ABBEOKUTA, or ABEOKUTA, a town of West Africa, in the Yoruba country, capital of Egba land, beautifully situated on a rocky and undulating plain on the left bank of the Ogun River, 81 miles (by river) north of Lagos. It was founded by a remnant of the Egbas in 1825, in order to protect themselves against the slave-hunting expeditions of surrounding peoples; and between 1842 and 1846 Christian missionaries established themselves here. The chief trades, besides agriculture, are those of the blacksmith, the carpenter, the weaver, the dyer, and the potter. Palm-oil and shea-butter are exported, and cotton is grown extensively in the neighbourhood. All the country here is now under British protection, and in 1893 the people made a treaty with Britain by which they agreed to refer disputed matters to the governor of Lagos, to permit free-trade, to protect the missionaries, and not to cede territory to any other power than Britain. There is a railway from Lagos. Pop. 150,000 to 200,000.

ABBESS. See ABBEY and ABBOT.

ABBEVILLE, a thriving town of France, in the department of the Somme, partly on the banks and partly on an island of the river of that name, and a station on the railway from Paris to Boulogne, about 108 miles N.N.W. of the former. It is built mostly of brick, but also contains some picturesque old wooden structures. Its principal edifice is the church of St. Vulfran, built during the reign of Louis XII., but never completed according to its original design. Its west front, in the flamboyant style, adorned with the richest tracery and with niches filled with statues, is particularly magnificent. There are other interesting churches, a public library, &c. It has manufactures of carpets, fine velvets, damask, ropes, &c., and carries on a considerable trade both by railway and river. The possession of Abbeville was keenly contested during the early French and English wars. Pop. (1906), 20,594.

ABBEY, a monastery or religious community of the highest class, governed by an abbot, assisted generally by a prior, sub-prior, and other subordinate functionaries; or, in the case of a female community, superintended by an abbess. An abbey invariably included a church. A priory differed from an abbey only in being scarcely so extensive an establishment, and was governed by a superior named a prior. In some English conventual establishments, as Canterbury, Norwich, Ely, &c., the archbishops or bishops held the abbot's place, the immediate governor of the monastery being called a prior. Some priories sprang originally from the more important abbeys, and remained under the jurisdiction of the abbots; but subsequently any real distinction between abbeys and priories was lost, though institutions continued to bear distinctively either one or the other name. Abbeys or monasteries first arose in the East. (See MONASTERY.) The larger establishments of this kind covered an extensive area, and might include a mill, bake-house, brew-house, store-houses, workshops for smiths, wrights, shoemakers, weavers, tailors, &c.; farm buildings and dwellings for the artisans, servants, and labourers; guest-house, infirmary, &c. The church formed the nucleus, and more immediately connected with it were the buildings devoted to the monastic life and its daily requirements, the refectory or eating-room, the dormitory or sleeping-room, the calefactory or room for social intercourse, the school for novices, and so on. Among the most famous abbeys on the European continent were those of Clugny, of Clairvaux, and Citeaux in France; the abbey of St. Galle in Switzerland, and of Fulda in Germany; among the most noteworthy English abbeys were those of Westminster, St. Mary's of York, Fountains, Kirkstall, Tintern, Rievaulx, Netley, Paisley, and Arbroath. See also the following article.

ABBOT, the head of the more important monasteries or conventual establishments called abbeys (see preceding article); the 'father' or superior of a religious community of men living under vows according to a particular rule or discipline. The name is derived from the Syriac or Chaldee word *abba*, father, through the L. *abbas, abbatis*, an abbot. The nunneries or religious establishments of the same rank for females are presided over by an *abbess*. In the early age of monastic institutions few of the monks were priests, the great majority being simply laymen who retired from the world to live in common devoted to a religious life. He whom they elected to preside over them and who received the name of *abbot* was originally a layman also. At this stage of their existence those communities were under the rule of the diocesan bishop. In the course of time the abbots (the corresponding title in the Eastern Church is *archimandrite* or *hegumenos*) were always ordained, and in the eighth century they

were permitted to ordain their monks to the minor orders. At first the abbeys were more remarkable for their numbers than for their magnitude or magnificence, but latterly large and richly-endowed abbeys reared their heads in every portion of Christendom. The status and privileges of the abbots increased correspondingly; many of them took rank with bishops and were exempted from episcopal jurisdiction; they were allowed the use of the mitre, crozier, and ring; and in England mitred abbots to the number of twenty-eight had seats in Parliament before the Reformation. Originally, as has been stated, the abbot was elected by the monks, and this right was solemnly recognized by the canon law, though the bishops might often interfere in elections. In time, however, as the wealth of the monasteries increased, princes and sovereigns arrogated to themselves the right of appointing abbots to the more important establishments; and for two centuries before the Reformation the appointment of abbots in England was divided 'by a kind of amicable arrangement' between the pope and the king. The wealth of the abbeys in time excited the greed of powerful laymen, and means were found of gratifying this. Numbers who had no idea of practising the rigours of monastic life were attracted to it by the secular advantages which it promised to bestow, and many of the most powerful families were seen eagerly striving to obtain the titles of abbot and abbess for their members. The great object of course was to obtain a control over the revenues of the abbeys, and for this purpose recourse was had to the device of holding them under a kind of trust, or as it was called, *in commendam*. According to the original idea the commendator was merely a temporary trustee, who drew the whole or part of the revenues during a vacancy, and was bound to apply them to specific purposes; but ultimately the original idea was lost sight of, and the 'commendator' became in many instances a proper beneficiary, who held the appointment for life, and was allowed to apply the whole or certain portions of the revenues to his own private use. Hence originated the large class of persons who were diffused over every part of Christendom, but were perhaps nowhere more numerous than in France, where they were known, while only in expectancy of preferment, by the name of *abbés de Sainte Esperance*, and after they had obtained it by that of *abbés commendataires*. By the canon law they were bound to have received the tonsure and to enter into orders on attaining the canonical age; but these obligations were easily evaded, or seldom enforced, and a large proportion of the abbés had nothing clerical either in their appearance or their conduct. (See ABBÉ). The endowments of these religious establishments latterly increased to such an extent that in the beginning of the sixteenth century no inconsiderable portion of the best cultivated districts of Europe were in their possession. The Reformation introduced vast changes, not only in Protestant countries, where abbeys and all other monastic establishments were generally suppressed, but even in countries which still continued Roman Catholic, many sovereigns, while displaying their zeal for the church by persecuting its opponents, not scrupling to imitate them in the confiscation of church property. In the United Kingdom there are comparatively few religious communities that now bear the name of abbeys, though the Roman Catholics have established a number of monasteries at various places. These, however, are mostly insignificant compared with the great abbeys of former days. One of the principal is the Benedictine Abbey at Fort Augustus, Inverness. It is chiefly in the Benedictine order that the name of abbot is kept up, prior, superior, rector, &c., being otherwise used instead. Though holding a position similar to the abbot the abbess never attained to equal power and importance, being always under the control of the bishop of the diocese, and of course unable to exercise priestly functions. The abbess is usually elected by the nuns of her monastery (as the abbot by the monks), and her age must not be less than forty years. She has a right to the ring and staff, like an abbot, and to have the abbatial cross or crozier borne before her.

ABBOT, CHARLES, Lord Colchester, born in 1757, was educated at Westminster and Oxford, and having been called to the bar in 1783, acquired a considerable practice. He entered Parliament for Helston in 1795, and proved a useful member of parliament. In 1800 he brought in a bill for taking a census of the population of the kingdom; the enumeration took place the following year, being the first decennial census made in England. In 1802 he was appointed speaker of the House of Commons, and by his casting-vote carried the motion for the impeachment of Mr. Dundas. While speaker, he introduced several important improvements in the mode of conducting public business, and on retiring from the office in 1816, was rewarded with a peerage under the title of Baron Colchester. He died in 1829.

ABBOT, GEORGE, Archbishop of Canterbury, was born October 29, 1562, and studied at Oxford, becoming afterwards vice-chancellor of the university. When the translation of the Bible was begun in 1604, by order of King James, he was one of the eight divines to whom it was committed. In 1608 he went to Scotland to assist in effecting a union between the church of that country and the Church of England, and conducted the business with much moderation and address. In December, 1609, he was made Bishop of Lichfield and Coventry; in January, 1610, Bishop of London; and in November following, Archbishop of Canterbury. His enemies ascribed his rapid promotion to flattery of the king. In 1613, however, he opposed James's project of a divorce between Lady Francis Howard and the Earl of Essex; and in 1618, when the royal declaration permitting Sunday sports was issued, he prohibited the reading of it in church. His health declining, he went to Hampshire for change of air in 1621, and being invited to a hunt by Lord Zouch, had the misfortune to shoot an attendant with an arrow aimed at a deer from a cross-bow. This accident affected him so much, that besides settling an annuity of £20 on the widow, he kept, during the remainder of his life, a monthly fast on Tuesday, the day of the unhappy event. Though troubled with the gout, he performed the ceremony of crowning Charles I. He was never much in this monarch's favour, and mainly through the influence and exertions of his vindicative enemy Laud, was suspended for a time from the exercise of his functions as primate on refusing to license a sermon preached by Dr. Sibthorpe, in justification of a loan demanded by the king. He died at Croydon, August 4, 1633, aged 71. During his life he published several works, chiefly theological; and many of his letters and speeches are to be found in various collections.

ABBOTSFORD, the well-known country seat of Sir Walter Scott, situated on the south bank of the Tweed, in Roxburghshire, in the neighbourhood of the public road between Melrose and Selkirk, and 3 miles west from the former. It is situated in the midst of picturesque scenery and historic associations. The estate was acquired by Sir Walter in portions at different times, the first, originally a small farm bearing the unromantic name of Cartley Hole, being bought in 1811. The mansion as built at first was not large; but by gradual additions it

finally became an extensive and irregular pile in various styles of Scottish architecture. Carved stones from old buildings have been built into the external walls of the house; a gateway was got from Linlithgow castle, and a roof from Roslin; and the entrance-hall, library, and other rooms are adorned with carved wood-work in the antique style. The whole is surrounded by flourishing woods planted by Sir Walter himself, and intersected by winding walks.

ABBOTT, Charles, Lord Tenterden, Chief-justice of the Court of King's Bench, was born of humble parentage in 1762, at Canterbury, and after receiving his education at the free grammar-school there, entered Corpus Christi College, Oxford, where, in 1784, he gained the chancellor's prize for a Latin poem on Aerostation. Having devoted himself to the study of the law, he was called to the bar in 1796. His progress at first was rather slow, but he continued gradually to work his way, and ultimately, by unwearied industry and the extent and depth of his legal knowledge, placed himself at the head of his profession. In 1816 he became judge successively in the Court of Common Pleas and in the Court of King's Bench, and in 1818 succeeded Lord Ellenborough as lord chief-justice. In 1827 he was raised to the peerage by the title of Baron Tenterden, and continued to discharge his judicial functions with consummate ability till his death in 1832. His fame rests partly on the soundness of his decisions, and partly on his Treatise on the Law Relative to Merchant Ships and Seamen, which has passed through many editions, and continues to be regarded as a standard.

ABBOTT, Jacob, American writer, was born 14th November, 1803, at Hallowell, Maine, studied theology, was in 1825–29 professor of mathematics at Amherst College, in 1829–34 director of the Mount Vernon Girls' School at Boston, for some time pastor of a Congregational church; latterly devoted himself to literature. He died 31st Oct., 1879. He wrote about 200 works altogether, the great bulk of them being intended for the edification or instruction of the young. A number of them go together to form series, the series in some cases including a large number of volumes. Thus the Rollo Books include twenty-eight volumes, Harper's Story-Books thirty-six volumes, the Gay Family Series twelve volumes, the Franconia Stories ten volumes. A considerable number of his books were intended for schools.—His brother, John Stephens Cabot Abbott, born 1805, died 1877, was also a prolific writer, his most important works being historical in character. They include the French Revolution of 1789, History of Napoleon Bonaparte, History of the Civil War in America, History of Frederick the Second, called Frederick the Great, &c. Like his brother he was for a time a Congregational pastor.

ABBREVIATIONS, or 'shortenings', are used in writing to save time and space, or, it may be, to ensure secrecy. The ancient copiers of MSS. invented many contractions to facilitate their labour. Greek MSS. abound in such, and hence often cannot be read without a previous regular study of Greek paleography. From MSS. these contractions were transferred to the printed editions of Greek authors, and hence regular lists of them were given in the earlier Greek grammars, because the knowledge of them was absolutely essential to the student. Among the Romans the marks of abbreviation, called *notæ* or *compendia scribendi*, were so numerous that, in a classification by L. Annæus Seneca, they amount to 5000. With the Latin language the ancient Roman abbreviations passed to the middle ages, appearing first on inscriptions and coins, then in manuscripts, and, more especially after the eleventh century, in charters and other legal documents. The use of them in legal documents was forbidden by an act of Parliament passed in the reign of George II. In the following list a number of abbreviations are alphabetically arranged:—

A.B., for L. *artium baccalaureus*, bachelor of arts, now commonly written B.A.; also for able (-bodied) seaman; Abp., archbishop; A.C., *ante Christum*, before Christ; Ac., acre; Acc., A/c, or Acct., account; A.C.P., associate of the College of Preceptors; A.D., *anno Domini*, in the year of our Lord; A.D.C., aide-de-camp; Ad lib., *ad libitum*, at pleasure; Æt. or Ætat. *ætatis* (*anno*), in the year of his age; A.H., the year of the Hegira; A.I.A., associate of the Institute of Actuaries; A.I.C.E., associate of the Institution of Civil Engineers; A.M., *ante meridiem*, forenoon; also, *anno mundi*, in the year of the world; and *artium magister*, master of arts; A.R.A., associate of the Royal Academy; A.R.A.M., associate of the Royal Academy of Music; A.R.C.O., associate of the Royal College of Organists; A.R.H.A., associate of the Royal Hibernian Academy; A.R.I.B.A., associate of the Royal Institute of British Architects; A.R.S.A., associate of the Royal Scottish Academy; A.S., A.-Sax., Anglo-Saxon; A.U.C., *ab urbe condita*, the year from the building of the city (Rome); A.V., the authorized version (of the Bible); B.A., bachelor of arts; Bart. or Bt., baronet; B.C., before Christ; B.C.L., bachelor of civil law; B.D., bachelor of divinity; B.L., bachelor of law; B.M., bachelor of medicine; Bp., bishop; B.Sc., bachelor of science; B.V., blessed Virgin; C., centigrade; C. or chap., chapter; C.A., chartered accountant; Cantab., *Cantabrigiensis*, of Cambridge; Cantuar., *Cantuariensis*, of Canterbury; C.B., companion of the Bath; C.C., catholic clergyman, county councillor; C.D.V., carte de visite; C.E., civil engineer; Cf., *confer*, compare; Ch.B., *chirurgiæ baccalaureus*, bachelor of surgery; C.I., Crown of India (order of); C.I.E., companion of the order of the Indian Empire; C.M., *chirurgiæ magister*, master in surgery; C.M.G., companion of the order of St. Michael and St. George; Co., company or county; C.O.D., cash on delivery; Cr., creditor; C.S., civil service; C.S.I., companion of the Star of India; Curt., current, present; C.V.O., commander, Royal Victorian Order; Cwt., hundredweight; D.C.L., doctor of civil law; D.D., doctor of divinity; Delt., *delineavit*, drew it; D.F., defender of the faith; D.G., *Dei gratia*, by the grace of God; D.L., deputy lieutenant; D.Lit. or D.Litt., doctor of literature or letters; Do., ditto, the same; D.O.M., *Deo Optimo Maximo*, to God, the best and greatest; D.P.H., diploma in public health; D.Phil., doctor of philosophy; Dr. doctor, also debtor; D.Sc., doctor of science; D.S.O., Distinguished Service Order; D.V., *Deo volente*, God willing; Dwt., pennyweight; E., east; Ebor., *Eboracensis*, of York; E.C., Established Church; E.E., errors excepted; E.G., *exempli gratia*, for example; E.R., *Eduardus Rex*, Edward King; E.R.I., *Eduardus Rex Imperator*, King and Emperor; Etc. or &c., *et cetera*, and the rest; F. or Fahr., Fahrenheit; F.C.P., fellow of the College of Preceptors; F.C.S., fellow of the Chemical Society; F.D., *fidei defensor*, defender of the faith; Fec., *fecit*, he made or did it; F.E.I.S., fellow of the Educational Institute of Scotland; F.F.A., fellow of the Faculty of Actuaries; F.F.P.S., fellow of the Faculty of Physicians and Surgeons (Glasgow); F.G.S., fellow of the Geological Society; F.I.A., fellow of the Institute of Actuaries; F.I.C., fellow of the Institute of Chemistry; Fl., flourished; Fla., Florida; F.L.S., fellow of the Linnæan Society; F.M., field-marshal; F.O.B., free on board (goods delivered); F.R.A.M., fellow of the Royal Academy of Music; F.R.A.S., fellow of the Royal Astronomical Society; F.R.C.O., fellow of the Royal College of Organists; F.R.C.P., fellow of the Royal College of Physicians; F.R.C.S., fellow of the Royal College of Surgeons (with E., I., or L., Edinburgh, Ireland, London); F.R.G.S., fellow of the Royal Geographical Society; F.R.I.B.A., fellow of the Royal Institute of British Architects; F.R.S., fellow of the Royal Society (with E., of Edinburgh); F.R.S.L., fellow of the Royal Society of Literature; F.S.A., fellow of the Society of Arts or Antiquaries; F.S.S., fellow of the Statistical Society; Ft., foot or feet; F.Z.S., fellow of the Zoological Society; Ga., Georgia; G.C.B., knight grand cross of the Bath; G.C.I.E., knight grand commander of the Indian Empire; G.C.M.G., knight grand cross of St. Michael and St. George; G.C.S.I., knight grand commander of the Star of India; G.C.V.O., knight grand cross of the Royal Victorian Order; G.P.O., general post-office; H.B.M., his Britannic majesty; H.E.I.C.S., honourable East India Company's service; H.H., his (or her) highness; Hhd., hogshead; H.I.H., his (or her) imperial highness; H.M.I.S., his majesty's inspector of schools; H.M.S., his majesty's ship (or service); H.P., horse-power; H.R.H., his (or her) royal highness; Ia., Iowa; Ib. or Ibid., *ibidem*, in the same place; Id., *idem*, the same; I.e., *id est*, that is; +I.H.S., usually looked upon as standing for *Jesus hominum salvator*, Jesus the Saviour of men, but it was originally IHΣ, the first three letters of IHΣOYΣ (*Iēsous*), the Greek form of *Jesus*; Imp., imperial, emperor, empress (L. *imperator*, *imperatrix*); Incog., *incognito*, unknown, not passing under one's own name; Inf., *infra*, below; I.N.R.I.,

Iesus Nazarenus Rex Iudæorum, Jesus of Nazareth, King of the Jews; Inst., *instante (mense)*, instant or of this month; Inv., *invenit*, designed, invented; I.O.G.T., Independent Order of Good Templars; I.O.O.F., Independent Order of Oddfellows; I.O.U., I owe you; I.q., *idem quod*, the same as; Ir., Irish; I.S.O., Imperial Service Order; J.P., justice of the peace; Jr., junior; K.C., king's counsel; K.C.B., knight commander of the Bath; K.C.M.G., knight commander of St. Michael and St. George; K.C.S.I., knight commander of the Star of India; K.C.V.O., knight commander of the Royal Victorian Order; K.G., K.P., K.T., knight of the Garter, of St. Patrick, of the Thistle; Kt. or Knt., knight; Ky., Kentucky; L.A., literate in arts; L.A.S., licentiate of the Apothecaries' Society; Lat., latitude, Latin; Lb. or ℔., *libra*, a pound (weight); L.C. *loco citato*, in the place cited; L.C.P., licentiate of the College of Preceptors; L.D.S., licentiate in dental surgery; Litt. D., *literarum doctor*, doctor of letters; L.L.A., lady literate in arts; LL.B., *legum baccalaureus*, bachelor of laws (the *l* being doubled because of the plural word); LL.D., *legum doctor*, doctor of laws; Lon. or Long., longitude; Loq., *loquitur*, speaks; L.R.C.P., licentiate of the Royal College of Physicians (with E., of Edinburgh); L.R.C.S., licentiate of the Royal College of Surgeons (with E., of Edinburgh); L.S., *locus sigilli*, the place of the seal; L.S.A., licentiate of the Society of Apothecaries; L.S.D., *libræ, solidi, denarii*, pounds, shillings, pence; M., monsieur, Mr.; M.A., master of arts; M.B., *medicinæ baccalaureus*, bachelor of medicine; M.D., *medicinæ doctor*, doctor of medicine; Md., Maryland; Mdlle., Mademoiselle, Miss; Me., Maine; Messrs., messieurs, gentlemen; M.F.H., master of fox-hounds; M.Inst.C.E., member of the Institution of Civil Engineers; M.I.Mech.E., member of the Institution of Mechanical Engineers; M.L.A., member of the legislative assembly; M.L.C., member of the legislative council; MM., messieurs; Mm., millimetres; Mme., madame; Mo., Missouri; M.P., member of Parliament; M.R.C.P., member of the Royal College of Physicians; M.R.C.S., member of the Royal College of Surgeons; M.R.C.V.S., member of the Royal College of Veterinary Surgeons; M.R.I.A., member of the Royal Irish Academy; MS., manuscript; MSS., manuscripts; Mus.B., bachelor of music; Mus.D., doctor of of music; M.V.O., member of the Royal Victorian Order; N. north; N.B., *nota bene*, take notice, also North Britain, New Brunswick; N.C., North Carolina; N.D., no date; Nem. con. or Nem. diss., *nemine contradicente*, or *nemine dissentiente*, no one contradicting or dissenting, that is, unanimously; N.H., New Hampshire; N.J., New Jersey; N.M., New Mexico; No. *numero*, number; N.P., notary public; N.S., new style, Nova Scotia; N.S.W., New South Wales; N.T., New Testament; N.Y., New York; N.Z., New Zealand; O., Ohio; Ob., *obiit*, died; Obs., obsolete; Obt., obedient; O.H.M.S., on her majesty's service; O.P., out of print; Op. cit., *opere citato*, in the work referred to; Or., Oregon; O.S., old style; O.T., Old Testament; Oxon., *Oxoniensis*, of Oxford; Oz., ounces; P., page, pp., pages; Pa., Pennsylvania; Par., paragraph; P.C., privy-councillor, police constable; Pd., paid; Per an., *per annum*, by the year; Per cent., *per centum*, by the hundred; Ph.D., *philosophiæ doctor*, doctor of philosophy; Pinx., *pinxit*, he painted it; P.M., *post meridiem*, afternoon; P.O., post-office; P.O.O., post-office order; P.P., parish priest; P.P.C., *pour prendre congé*, to take leave; P.R., prize ring (pugilistic); P.R.A., president of the Royal Academy; Pro tem., *pro tempore*, for the time being; Prox., *proximo (mense)*, in the next month; P.R.S.A., president Royal Scottish Academy; P.S., postscript (P.P.S., additional postscript); P.T.O., please turn over; Q., question; Q.C., queen's counsel; Q.E.D., *quod erat demonstrandum*, which was to be demonstrated; Q.E.F., *quod erat faciendum*, which was to be done; Q.M., quarter-master; Q.M.G., quarter-master-general; Qr., quarter; Q.S., *quantum sufficit*, as much as is sufficient, quarter sessions; Q.V., *quod vide*, which see; R.A., royal academician, royal artillery; R.A.M., Royal Academy of Music; R.A.S., Royal Asiatic Society; R.C., Roman Catholic; R.C.P., Royal College of Physicians; R.C.S., Royal College of Surgeons; R.D., rural dean; R.E., royal engineers; Rev., reverend; R.G.S., Royal Geographical Society; R.H.A., Royal Horse Artillery; R.I., Rhode Island; R.I.P., *requiescat in pace*, may he or she rest in peace; R.M., royal marines; R.N., royal navy; R.S.A., royal Scottish Academician; Rt. Hon., right honourable; Rt. Wpful., right worshipful; R.W.S., Royal Society of Painters in Water-colours; S. or St., saint; Sc., *scilicet*, namely, viz.; Sc.D., *scientiæ doctor*, doctor of science; Sculp., *sculpsit*, engraved it; Sec., secretary; Seq., *sequentes* or *sequentia*, the following; S.J., Society of Jesus (that is, Order of the Jesuits); S.P.C.A., Society for the Prevention of Cruelty to Animals; S.P.C.K., Society for Promoting Christian Knowledge; S.P.Q.R., *senatus populusque Romanus*, the senate and people of Rome; S.S.C., solicitor before the supreme courts (in Scotland); St., street; S.T.P., *sanctæ theologiæ professor*, professor of divinity; T.C.D., Trinity College, Dublin; Temp., *tempore*, in the time of; T.O., telegraph office; Ult., *ultimo (mense)*, last month; U.F., United Free Church; U.S., United States; U.S.A., United States of America; U.S.N., United States Navy; V., *vide*, see, *versus*, against; Va., Virginia; V.C., Victoria cross, vice-consul; Viz., *videlicet*, to wit, or namely; V.P., vice-president; V.R., *Victoria Regina*, Victoria Queen; V.R.I., *Victoria Regina Imperatrix*, Queen and Empress; V.S., veterinary surgeon; Vt., Vermont; W.I., West Indies; W.S., writer to the signet (Scotland); Xmas., Christmas; Xn., Christian; Y^e, the; Y.M.C.A., Young Men's Christian Association; Y.W.C.A., Young Women's Christian Association; Yr., younger.

ABDERA, an ancient and flourishing Greek city on the Thracian coast, colonized by Timesius of Clazomenæ about 656 B.C., and a second time by the Teians in 544 B.C. Though it boasted of being the native place of Democritus, Anaxarchus, and Protagoras, its inhabitants were proverbial for stupidity.

ABDICATION, properly the voluntary, but sometimes also the involuntary resignation of an office or dignity, and more especially that of sovereign power. The most famous of voluntary royal abdications are those of the Emperors Diocletian and Maximian in 305; of the Emperor Charles V. in 1556; of Christina, queen of Sweden, in 1654; of Louis Bonaparte of Holland in 1810; of Louis of Bavaria in 1848; of Ferdinand of Austria in 1848; of Isabella of Spain in 1870; and of Amadeus of Spain in 1873. Among involuntary abdications may be specified those of Napoleon in 1814 and 1815; of Charles X. of France, in favour of the Duke of Bordeaux, in 1830; and of Louis-Philippe, in favour of his grandson, the Count of Paris, in 1848. More recently have occurred the abdications of Prince Alexander of Battenberg, prince of Bulgaria, in 1886, and King Milan of Servia in 1889. Abdication does not necessarily require the execution of a formal deed, but may be presumed from facts and circumstances, as in the case of the English Revolution in 1688, when it was resolved by both houses of Parliament that 'King James II., having by the advice of Jesuits and other wicked persons violated the fundamental laws, and withdrawn himself out of the kingdom, has *abdicated* the government, and that the throne is thereby vacant.' Yet the sovereign of Great Britain cannot constitutionally abdicate of his or her own free-will without the consent of both houses of Parliament.

ABDOMEN, a Latin term of doubtful etymology, by some derived from *abdo*, I hide. It means, 1. In human anatomy, the belly or lower cavity of the trunk, separated from the upper cavity or *thorax*, by the *diaphragm* or *midriff*, and bounded below by the bones of the *pelvis*. The whole cavity, though alternately enlarged and contracted by the action of the diaphragm, is occupied by the viscera belonging to the digestive and urinary systems; the pelvic cavity, containing the urinary bladder and reproductive organs, being regarded usually as distinct from the abdominal cavity proper. Anatomists have divided the abdomen into various regions by imaginary lines. Two of these lines drawn transversely, the one between the seventh ribs, and the other between the projecting bones of the pelvis, form three regions—an upper or *epigastric*, a central or *umbilical*, and a lower or *hypogastric*. In like manner, two longitudinal lines are drawn, the one on the right and the other on the left side, between and nearly at right angles to the former. The central parts of the divisions thus formed, retain as before the names of epigastric, umbilical, and hypogastric, but the external parts form six new regions, two above, called right and left *hypochondriac*, two central, called right and left *lumbar*, and two below, called right and left *iliac*.—2. In entomology, the whole body of an insect behind the thorax. It usually consists of rings or short hollow cylinders, which are united by a joint or membrane, and in some cases, as in the grub of the chameleon-fly, slide upon one another like the tubes of a telescope.

ABDUCTION, a legal term, generally applied to denote the offence of carrying off a female, either forcibly or by fraudulent representations. Such a delinquency in regard to a man is styled *kidnapping*. There are various descriptions of abduction recognized in criminal jurisprudence, such as that of a child, of an heiress, or of a wife. By 24 and 25 Vict. cap. c. sec. 53 (1861) it is enacted that where any woman has interest, present or future, in any real or personal estate, or is heiress presumptive or next of kin to any one having such interest, if any person from motives of lucre take away or detain such woman against her will, with intent to marry or defile her, or to cause her to be married or defiled, every such offender, and every person counselling, aiding, or abetting, is guilty of felony subject to penal servitude for not more than fourteen or less than three years, or to imprisonment for not more than two years. The statute prohibits the offender from taking any of her property. Under the Criminal Law Amendment Act (1885) it is unlawful to take possession, or cause to be taken possession of, any girl under the age of *eighteen* (unless the party believe she is over this age), with intent to defile her, without consent of her parents or legal guardians. It is also an offence to take possession of a girl under *sixteen* (no matter with what intent) without such consent. Both offences are punishable with two years' imprisonment and hard labour.

ABD-UL-LATIF, an eminent Arab writer, born at Bagdad in 1161, received a liberal education, and made himself particularly acquainted with medicine, which he practised till 1185, when he quitted his native town and went to reside at the court of Saladin in Damascus. After the death of Saladin, who had liberally assisted him, he went to Cairo, which he had previously visited, delivered lectures on medicine and other sciences, and published an excellent description of Egypt, which is still extant, and forms the foundation of his fame. He afterwards returned to Syria, and in the course of prosecuting a pilgrimage to Mecca was taken ill at Bagdad, and died there in 1231.

ABDUL-MEJID KHAN, Sultan of Turkey, was born on the 23rd April, 1823, or, according to other authorities, 6th May, 1822, and after spending his early years, as is customary with the sons of the sultan, in the seclusion of the harem, where he received but a very imperfect education, succeeded his father, Mahmoud II., on the 1st July, 1839. At the time of his accession Turkish affairs were in a critical condition. Mehemet, pasha of Egypt, had a second time risen against the Turkish yoke, his son Ibrahim had inflicted a severe defeat on the Turks at Nizib (24th June, 1839), and was advancing on Constantinople, where a strong party, irritated by the reforms carried out by Mahmoud, secretly conspired to satisfy the ambition of Mehemet Ali by raising him to the imperial throne. Ten days previously the grand admiral treacherously placed the Ottoman fleet in the hands of the enemy. But the intervention of the leading European powers checked the designs of Mehemet Ali, and saved the Turkish Empire. Abdul-Medjid was desirous of continuing the reforms initiated by the two preceding sultans, but he lacked the strength and perseverance necessary to overcome the many obstacles placed in his way; and thus most of his reforms remained inoperative, or caused bloody insurrections where attempts were made to carry them out. On 3rd November, 1839, he promulgated the Hatti-sheriff of Gulhané, a bill of rights which guaranteed to all his subjects equality before the law, without distinction of creed or race. An equitable mode of taxation was to take the place of the arbitrary levies of grasqing governors, and a juster system of conscription was promised; but these promises were of little avail against the prejudice of the masses and the opposition of the ruling classes. A board of education was organized in 1845; and a year later a system of free schools was established, and a university, and military, medical, and agricultural colleges were founded. When Kossuth and a number of his followers fled to Turkey after the failure of the Hungarian insurrection in 1849, Abdul-Medjid was called upon by Russia and Austria to give them up, but this he boldly refused to do. Owing to disputes between the Latin and Greek Churches regarding the rights of precedence and possession at the 'holy places' in Palestine, and to demands made by the czar virtually implying the right of protectorate over the Christian subjects of the sultan, war broke out between Turkey and Russia in 1853; in the following year the Sublime Porte effected an alliance with France and England, and later on with Sardinia. With the conduct of this war the sultan had personally little to do. (See CRIMEA, OTTOMAN EMPIRE.) Towards the latter part of his reign he gave way to indolence, sensuality, and extravagance. He died 25th June, 1861, and was succeeded, not by one of his seven sons, but by his brother, ABDUL-AZIZ KHAN, the oldest living member of the family of Osman. After an inglorious reign Abdul-Aziz committed suicide (or was murdered) in June, 1876, leaving the crown to Mehemmed Murad, oldest son of Abdul-Medjid, who, becoming insane, was soon deposed in favour of his brother, Abdul-Hamid.

A BECKETT, GILBERT ABBOTT, comic writer, was born in London on Jan. 9th, 1811. Educated at Westminster School, he studied law and was called to the bar, and in 1849 he was appointed a metropolitan police magistrate, a post which he occupied till his death at Boulogne in 1856. Throughout his life, even from his earliest years, he was connected with various comic and other journals, some of them started by himself. He founded and was the first editor of Figaro in London, a forerunner of the more famous Punch, with which also he was connected from the start, and for some time he contributed to the Times, the Illustrated London News, and other newspapers. Of his published books we may mention the Almanac of the Month (1846), in which he was assisted by other famous members of the staff of Punch; Comic History of England; Comic History of Rome; Comic Blackstone; and The Quizziology of the British Drama. He also wrote many popular plays, and dramatized some of Dickens's works. His third son, ARTHUR WILLIAM, born in 1844, barrister, followed in his father's footsteps. He was a war-correspondent during the Franco-German war, joined the Punch staff in 1874, and published various clever and amusing works. He died on 14th Jan., 1909.

ABEL, properly *Hebel* (Heb., breath, vapour, transitoriness), the second son of Adam. He was a 'keeper of sheep', and appears, both from the testimony of our Lord himself (Mat. xxiii. 35), and from Heb. xi. 4 and 1 John iii. 12, to have been distinguished by the vigour of his faith and the purity of his life. In the early church Abel was considered the first martyr, and several of the fathers, among others St. Chrysostom and Augustine, regard him as a type of Christ.

ABELARD (or ABAILARD), PIERRE, a monk of the order of St. Benedict, equally famous for his learning and his passion for Heloise, was born in 1079, near Nantes, in the little village of Pallet, which was the property of his father Berenger. His inclination led him to prefer a literary life; and in order to devote himself fully to philosophy he ceded his patrimony to his brothers. He studied poetry, rhetoric, philoso-

phy, jurisprudence, and theology, the Greek, Hebrew, and Latin languages; but scholastic philosophy chiefly engaged his attention. Having learned all that Brittany could teach him, he went to Paris, the university of which attracted students from all parts of Europe. Guillaume de Champeaux, a follower of Anselm and an extreme Realist, was the most skilful disputant of his time, and Abelard, profiting by his instructions, was often victorious over his master in contests of wit and logical acumen. The friendship of Champeaux was soon succeeded by enmity; and Abelard, who had not yet completed his twenty-second year, removed to Melun, whither he was soon followed by a multitude of young men, attracted from Paris by his great reputation. Hostility still pursued him, but he left Melun for Corbeil, nearer the capital, where he was still more admired and persecuted. Soon after he ceased teaching for a time to recruit his strength in his native place; and after two years he returned to Paris, and found that his former teacher had removed to a monastery outside the city. He again joined issue with him and gained so complete a triumph that he abandoned teaching in Melun, where he had established himself once more, and opened in Paris a school of rhetoric, the fame of which soon deprived all the others of their pupils. Shortly afterwards he was appointed to his rival's chair in the cathedral school of Notre-Dame, where he lectured on rhetoric, philosophy, and theology, and educated many distinguished scholars, among whom were the future Pope Celestin II., Peter of Lombardy, Bishop of Paris, Berenger, Bishop of Poictiers, and St. Bernard. At this time there resided close to Notre-Dame a young lady, by name Heloise, niece to the canon Fulbert, then of the age of seventeen, and remarkable for her beauty, genius, and varied accomplishments. Abelard became inspired with such violent love for Heloise as to forget his duty, his lectures, and his fame. Heloise was no less susceptible. Under the pretext of finishing her education he obtained Fulbert's permission to visit her, and finally became a resident in his house. His heartless conduct in not only abusing the confidence which had been placed in him, but in circulating verses in which he celebrated his guilty triumph, at last opened the eyes of Fulbert. He separated the lovers, but too late. Abelard fled with her to Brittany, where she was delivered of a son, who died early. He now resolved to marry her secretly. Fulbert gave his consent, the marriage was performed, and in order to keep it secret Heloise remained with her uncle, whilst Abelard retained his former lodgings, and continued his lectures. They saw each other but seldom; Fulbert, however, thought the reputation of his niece would be injured by this secret union, and made it known; but Heloise, valuing Abelard's fame higher than her own good name, was so infatuated as to deny, with the solemnity of an oath, that any marriage had taken place. Fulbert, naturally exasperated, is said to have had recourse to harsh treatment, and Abelard succeeded in carrying her off a second time, and placed her in the convent of Argenteuil. Fulbert erroneously believed it was intended to force her to take the veil, and under the influence of rage subjected Abelard to an ignominious mutilation. He became, in consequence, a monk in the abbey of St. Denis, and Heloise took the veil at Argenteuil. After time had somewhat moderated his grief he resumed teaching, and again attracted many students, at the same time incurring new persecutions. At the Council of Soissons (1121), no defence being permitted him, his Essay on the Trinity was declared heretical, and he was condemned to burn it with his own hands. Continued persecutions obliged him at last to leave the abbey of St. Denis and to retire to a place near Nogent-sur-Seine, where he built a rude hut in which he determined to live a hermit's life. Even here, however, students flocked to him, and they built him an oratory, which he dedicated to the Holy Ghost and hence called *Paraclete*. Being subsequently appointed Abbot of St. Gildas de Ruys, in Brittany, he invited Heloise and her religious sisterhood, on the dissolution of their monastery at Argenteuil, to reside at the above oratory, and received them there. The lovers saw each other here again for the first time after a separation of eleven years. He lived for some ten years at St. Gildas, which afforded him but a gloomy residence, troubled as he was by unsuccessful attempts to reform the monks, who even threatened his life, and probably still more by the remorse which he could not but feel when he thought of his treatment of Heloise. Ultimately, however, he fled from it and lived for a time in other parts of Brittany. St. Bernard of Clairvaux, the leading opponent of the rationalistic school of Abelard, laid his doctrines before the Council of Sens, in 1140, had them condemned by the pope, and obtained an order for his imprisonment. Abelard appealed to the pope, published his defence, and went to Rome. Passing through Cluny he visited Peter the Venerable, who was abbot there. This humane and enlightened divine effected a reconciliation between him and his enemies, but Abelard resolved to end his days in retirement. The severe penances which he imposed upon himself, together with the grief which never left his heart, gradually consumed his strength, and he died, a pattern of monastic discipline, in 1142, at the abbey of St. Marcel, near Châlon-sur-Saône. Heloise begged his body, and had him buried in the Paraclete, of which she was at that time the abbess, with the view of reposing in death by his side. In 1800 the ashes of both were carried to the Museum of French Monuments at Paris, and in November, 1817, were deposited under a chapel within the precincts of the church of Monamy. The small chapel, in the form of a beautiful marble monument, in which the figures of the ill-fated pair are seen reposing side by side, is now one of the most interesting objects in the Parisian cemetery of Père la Chaise. Abelard was distinguished as a grammarian, orator, logician, poet, musician, philosopher, theologian, and mathematician; but very few of his works are preserved to us. As a philosopher he founded an eclectic system commonly, but erroneously, termed Conceptualism, which lay midway between the prevalent Realism, represented in its most advanced form by William of Champeaux, and extreme Nominalism, represented in the teaching of his other master Roscellin, and largely approached the Aristotelian philosophy. His love and his misfortunes have secured his name from oblivion; and the man whom his own century admired as a profound dialectician is now celebrated as the martyr of love. The letters of Abelard and Heloise have been often published in the original and in translations. Pope's poetical epistle Eloisa to Abelard is founded on them. Abelard's autobiography, entitled Historia Calamitatum, is still extant. The chief work on the life of Abelard is Remusat's Abélard (two vols. Paris, 1845). See also Compayré's Abelard and the Origin and Early History of Universities (1893—series of Great Educators). A complete edition of his works was published by Cousin (two vols. Paris, 1849–59).

ABENCERRAGES, one of the most powerful and distinguished Moorish families in Granada at the time when this kingdom was gradually sinking under the blows of Christian Spain. Their destruction is connected with a romantic incident, which has

furnished the subject of many poems both Arabic and Spanish. One of the Abencerrages was loved by a sister of the reigning king, Abu-Hassan, and gained admission into the Alhambra by scaling its walls. The king became acquainted with the intrigue, and took his revenge by collecting thirty-six of the Abencerrages within the Alhambra under some specious pretext, and then massacring them. The story is told in the Guerras Civiles de Grenada by Gines Perez de Hyta, which professes to be a translation of an Arabic manuscript, but the inexorable criticism of last century has been at some pains to discredit its authenticity.

ABEN EZRA, or ABRAHAM BEN MEIR BEN EZRA, a celebrated Jewish rabbi, was born at Toledo shortly after 1090, travelled in pursuit of knowledge in England, France, Italy, and Greece, and is supposed to have died in Rhodes about 1170. He bears, among the Jews, the surnames of Great, Wise, and Admirable, and left behind him a great number of works, theological, astronomical, &c., which, making some allowance for Jewish partiality, almost justify his high reputation. He particularly distinguished himself as a commentator on Scripture, and has the merit of having brought allegorical interpretation into disrepute, by substituting for it the grammatical and literal sense. His commentary on the Bible is printed in Buxtorf's Biblia Rabbinica.

ABER, a prefix in Celtic geographical proper names signifying the mouth or entrance of a river into the sea, or into another stream. It is used chiefly in Wales and Scotland.

ABERAVON, or ABERAFON, a municipal and parliamentary borough of South Wales, in Glamorganshire, near the mouth of the Avon, which enters Port Talbot, a commodious harbour, on which more than £1,000,000 has been lately expended. It has rapidly advanced in recent years from a mere village to a large town, a result principally attributable to the increased railway facilities, and the opening of new collieries and other works in the neighbourhood. It has a large export of coal and wrought metal, and unites with Swansea and other places in sending a member to Parliament. Pop. of mun. bor. in 1901, 7553; of parl. bor. 18,874.

ABERAYRON, or ABERAERON, a seaport of Wales, on the coast of Cardiganshire, about 14 miles south-west of Aberystwith. It is a popular health resort, and imports coal, timber, limestone, &c. Pop. 1300.

ABERCARN, a town of England, in Monmouthshire, about 10 miles north-west of Newport, between it and Ebbw Vale. It has places of worship for various denominations, a public hall, extensive collieries, tin-plate works, engineering works, iron foundry, &c. Pop. in 1891, 10,500; in 1901, 12,607.

ABERCONWAY, or CONWAY. See CONWAY.

ABERCROMBIE, JOHN, M.D., a distinguished writer on medical and moral science, and an eminent physician, son of the Rev. George Abercrombie, of Aberdeen, was born in that city 10th October, 1780. His father was one of the ministers of Aberdeen, and his parental training and example produced a permanent effect in moulding the high character of the son. He received his medical education in Edinburgh when the medical school of the Scottish metropolis stood unrivalled in the empire. On completing the prescribed course of study he graduated at the University of Edinburgh in 1803, in his twenty-second year. He continued his studies at St. George's Hospital, London, and returned to Edinburgh in 1804, soon afterwards beginning a general practice which became more and more extensive. The benevolence of his nature early exhibited itself in devising plans for the medical superintendence of the poor, an object which he pursued with persevering zeal amidst the absorbing labours incident to the establishment of a professional reputation. On the death of Dr. Gregory, in 1821, Dr. Abercrombie became a candidate for the chair of medicine in the University of Edinburgh, but was unsuccessful. He stepped, however, into Dr. Gregory's practice as a consulting physician, in which capacity he was long resorted to by patients from all parts of Scotland. Elected licentiate of the College of Physicians in 1823, he became Fellow in the following year, and about the same time he was appointed to the honorary office of physician to the king in Scotland. In 1835 the University of Oxford conferred on him the honorary degree of Doctor of Medicine. Apart from the enduring value of several of his medical treatises, his literary celebrity rests chiefly on the work entitled Inquiries concerning the Intellectual Powers and the Investigation of Truth, which appeared in 1830, being succeeded in 1833 by the Philosophy of the Moral Feelings as a sequel to the former. These works evince uncommon powers of observation and reflection, combined with a charming ease and simplicity of expression, but they have now no philosophical value. He also occupied many spare minutes in writing short tracts for the poor. Amongst the more important works devoted to medical and surgical topics are his Pathological and Practical Researches on Diseases of the Brain and the Spinal Cord; and Pathological and Practical Researches on the Diseases of the Intestinal Canal and Liver, and other Viscera of the Abdomen. He died suddenly on the 14th November, 1844, of a rupture of the coronary vessels of the heart.

ABERCROMBY, PATRICK, Scottish antiquary and historian, was born at Forfar in 1656, and died probably in 1716 or shortly afterwards. His chief work is his Martial Atchievements of the Scots Nation (1711–16), a book of considerable value.

ABERCROMBY, SIR RALPH, a distinguished British general, was born in 1734 at Menstrie, in the parish of Logie, Clackmannanshire. Being designed by his father for the Scottish bar, he was educated at Rugby, studying afterwards from 1752 to 1755 at the Universities of Edinburgh and Leipzig. Following his natural inclination, however, he entered the army in 1756 as cornet in the 3rd Regiment of Dragoon-guards; and he gradually passed through all the ranks of the service until he became a major-general in 1787. On the commencement of the war with France he was employed in Flanders and Holland, with the local rank of lieutenant-general, and in that critical service displayed equal skill and humanity. In the attempt upon Holland in 1793 Sir Ralph had the sole command on the first landing, but the Duke of York subsequently arrived, and under him Sir Ralph acted. The final failure of the expedition is well known. In 1795 he received the order of the Bath, and was appointed commander-in-chief of the forces in the West Indies. In this expedition he captured the islands of Grenada, St. Lucia, St. Vincent, and Trinidad, with the settlements of Demerara and Essequibo. On his return in 1798 he was appointed commander-in-chief in Ireland, but his attempts to reform the army system there met with no support from the government, and he was quickly removed to the corresponding command in Scotland. The next and concluding great service of this able and meritorious officer was in the expedition to Egypt, of which he was commander-in-chief. He landed, after a severe contest, at Aboukir, March 8, 1801; and on the 21st of the same month was fought the battle of Alexandria, in which Sir Ralph was wounded in the thigh by a musket-ball. He kept the field during the day, and only when he saw the enemy in full retreat would he allow himself

fainting with pain and loss of blood, to be carried on board the admiral's ship. The bullet could not be extracted; mortification set in, and seven days later he died. His body was conveyed to Malta, and interred beneath the Castle of St. Elmo, and a monument was voted to him by Parliament in St. Paul's Cathedral. His widow was also created Baroness Abercromby, with remainder to the issue male of her late husband, and a pension of £2000 a year was granted in support of the dignity.

ABERDARE, a town of South Wales, in Glamorganshire, pleasantly situated at the junction of the Cynon and Dare, 4 miles south-west of Merthyr-Tydvil. The extensive coal and iron mines in the vicinity have caused a rapid increase in the population, and from a small village Aberdare has become one of the most important places of business in South Wales. There are some handsome places of worship, banks, and hotels, and two public parks. The town is well supplied with water. It is connected by railway and canal with Cardiff, to which it sends much coal for shipment. Aberdare is comprised in the parl. borough of Merthyr-Tydvil. Pop. of town in 1881, 33,796; in 1891, 38,513; in 1901, 43,357.

ABERDEEN, a maritime county in the north-east of Scotland, bounded on the west, north-west, and north by the counties of Inverness and Banff, on the south and south-east by those of Perth, Forfar, and Kincardine, and on the east and north by the North Sea. It is about 100 miles in length E.N.E. to W.S.W., and about 50 miles in width at the broadest part, at right angles to its length, diminishing in the south-west to about 10 miles. It has 60 miles of a sea-coast, about 14 of which, from the Dee to the Ythan, are low and sandy; the remainder is mostly bold and rocky, and in some places deeply penetrated by remarkable clefts and caverns. The county has an area of 1,268,251 acres, and is popularly divided into six districts (Mar, Formartine, Buchan, Alford, Garioch, and Strathbogie). It has over 80 civil parishes, a larger number than is contained in any other Scottish county. It is generally hilly or undulating, and in the south-west is distinctly mountainous. Here are Ben Muichdhui, 4296 feet, the second highest mountain in Scotland (on the Banffshire border); Braeriach, 4248 (on the Inverness-shire border); Cairn Toul, 4241; Ben-a-bourd, 3924; Lochnagar, 3786, and various other mountains exceeding 3000 feet in height. These mountains present, in some places, vast precipices, a few of them exceeding 1000 feet in height. Their summits are generally bare, rounded, and covered with detached masses of granite. The predominant rocks of the county are granite, gneiss, and mica-slate; and patches of serpentine occur in parts. Trap-rocks are of common occurrence. The most valuable mineral product is granite, large quantities of which are exported yearly from the quarries near Aberdeen and Peterhead, while it is much employed for tombstones, monuments, and various ornamental purposes. The granite is of two chief colours, gray and red; is extremely hard, and susceptible of a high polish. Other rocks are limestone, sandstone, and clay-slate. Several descriptions of gems, including cairngorm and topaz, are occasionally found. Chalybeate springs occur in several places, the most celebrated being those of Pananich, near Ballater. The principal rivers are the Dee and the Don, both of which enter the sea at the town of Aberdeen. The former (chief tributary the Gairn) rises in the south-west part of the county, in the mountains on the Inverness-shire border, at a height of nearly 4000 feet. The latter (chief tributary the Urie) has its source on the west border of the county, at an elevation of nearly 2000 feet above the level of the sea. The salmon fisheries of the Dee and Don, especially the former, are valuable, and quantities of salmon are exported. Other streams are the Ythan, the Ugie, and the Deveron, with its tributary the Bogie. Amongst the few lakes in Aberdeenshire may be mentioned Loch Muick, at the foot of Lochnagar, a small sheet of water, situated amongst the mountains in the south-west part of the county, at a height of 1310 feet above the level of the sea. The scenery around it is singularly wild and picturesque. In the south-west of Aberdeenshire there are some extensive forests, including those of Ballochbuie, Balmoral, &c., in which are many magnificent specimens of the Scotch fir, some of them supposed to be from 300 to 400 years old. The largest measure 13 or 14 feet in girth 6 feet from the ground, and are about 60 feet in height. The soil is not in general naturally fertile; nevertheless Aberdeenshire has about double the acreage under the plough that any other Scottish county has. The finest arable land lies chiefly between the Don and the Ythan. In the lower parts round the coast clay is prevalent; in the upper arable districts there is a large extent of light, sharp, sandy loam. Sand, moor, and moss prevail on the hills and higher grounds, occupying, with the mountainous tracts and other waste lands, a very large area. The climate is, on the whole, mild, but the summer rather short, and somewhat cold. All the crops usual in other parts of the country, with the exception of wheat, for which neither the soil nor the climate is suitable, succeed well here. The chief grain crop is oats, the chief green crop turnips. But the most important object now with the tenantry is the rearing of cattle, immense numbers of which are exported annually. The native breed—the polled Aberdeen (or Angus)—which is said to have greatly increased in size since the introduction of turnip feeding, is preferred by the best judges. Dairy husbandry has also made great progress. Sheep are reared, but the county does not stand very high in this respect. Agriculture is the chief occupation of the inhabitants; but there are also considerable numbers employed in fishing, in quarrying and polishing granite, and in various manufacturing and other industries (paper-making for instance), chiefly in and around the city of Aberdeen (which see). The scenery in the mountainous parts of the county is of the most magnificent description, and attracts numerous visitors in the summer season, the valley of the Dee being the locality most usually visited. On the banks of the Dee, midway between Ballater and Braemar—both favourite resorts of visitors—is situated Balmoral, the summer residence of Queen Victoria. (See BALMORAL CASTLE.) Here also is Abergeldie Castle; and there are many old and interesting castles scattered over the county. The county returns two members to Parliament, being divided into East and West Aberdeenshire. County town, Aberdeen. Pop. in 1871, 244,603; in 1891, 284,036; in 1901, 304,439.

ABERDEEN, the 'Granite City', a university town, royal and parliamentary burgh, and seaport of Scotland, county town of Aberdeenshire, is situated mostly on rising ground, at the mouth and on the left or north bank of the river Dee, between it and the Don; a small portion being on the south or Kincardineshire side of the Dee. Old Aberdeen, formerly a small burgh independent of New Aberdeen, and lying between it and the Don, is now included within the city boundaries. The town is very handsome; the streets, in general, are spacious and regular, and the houses almost wholly built of fine grayish-white granite from quarries in the neighbourhood. The principal street is Union Street (running from E.N.E. to W.S.W.), with its continuations

Castle Street and Union Place, in the line of which a splendid granite bridge (Union Bridge, by Telford), of one arch, 132 feet span, and 56 feet from the base of the piers to the top of the parapet, is thrown over the valley of the Den Burn. Among the principal public buildings are those of Marischal College and King's College (the two colleges of Aberdeen University), the old cathedral of St. Machar, numerous churches, the county buildings, the Grammar School, the Royal Infirmary, the Lunatic Asylum, Gordon's College, the Music Hall buildings, the Free Church College, the Trades' Hall, the market building, the barracks, the post-office, the theatre and opera-house, School of Art, Art Gallery, the public library, Salvation Army buildings, &c. Marischal College, a granite building in the perpendicular Gothic style (in a somewhat confined area off Broad Street), was erected in 1837–41, but has recently been greatly enlarged, funds being provided mainly by private liberality. A new and noble main frontage block, 400 ft. long, new classrooms, &c., and a public hall have been added (the last associated with the name of Dr. C. Mitchell of Newcastle, a munificent donor), and the main tower has been raised to 235 ft., and provided with an open-work spire, forming a conspicuous object. King's College, in Old Aberdeen, has as its most interesting features the old chapel and its tower, dating from about or shortly after 1500. The chapel consists of a nave, without pillars or side aisles, terminating in a triangular apse, and contains an elaborate and richly carved oak screen, unparalleled in Scotland, and perhaps in Britain. The tower is flanked by strong buttresses, and surmounted by a double crown in stone, with ball and cross on top. With the exception of the Cromwell Tower (erected under the rule of General Monk in Scotland) the rest of the buildings here are modern, among them being the general library. Arts and divinity are chiefly taught at King's College, medicine and law at Marischal. (See ABERDEEN UNIVERSITY.) St. Machar's Cathedral in Old Aberdeen, partially built between 1356–80, is a plain but massive and stately granite structure, consisting of a nave and aisles, with two western spires, having between them the great western window divided by five tall shafts of stone, and beneath it a round-arched doorway. It now serves as a parish church, and the flat ceiling is adorned with forty-eight modern heraldic shields of old benefactors duly emblazoned. Many of the churches are fine structures. Among the most prominent are the East and West Churches, joined so as to form a continuous structure, with a fine tower and spire and peal of thirty-six bells. They are situated in St. Nicholas churchyard (two acres), off Union Street, from which the open area is separated by a striking colonnade of the Ionic order. The county and municipal buildings, which have their main frontage to Castle Street, and are built in the Scotch baronial style, with a tower 210 feet high, form one of the largest and most imposing granite structures in Scotland. The Grammar School is a handsome modern building in the same style of architecture; the old and unpretending school in which Byron was a pupil has disappeared. The Royal Infirmary is a Grecian edifice with a dome, on a prominent site, and has recently been much enlarged. The Music Hall buildings are commodious, and have a handsome Ionic portico in Union Street. The Trades' Hall, adjoining Union Bridge, is a fine granite structure in the Elizabethan style, and contains a remarkable set of old carved chairs, the old shields of the different crafts, portraits by Jameson, &c. There are several handsome banks and insurance offices, and the North of Scotland and Town and County Bank has its headquarters here. There are statues of Queen Victoria and Albert, the Prince Consort, also of the fifth Duke of Gordon (granite), General Charles G. Gordon, Burns, and William Wallace. The old market cross, in Castle Street, is a fine specimen of the ornamental architecture of the seventeenth century. There are many charitable and benevolent institutions. Robert Gordon's College (founded in 1729) is an institution which formerly maintained and educated within its walls a large number of boys, the sons of decayed burgesses, &c., and up till 1881 was known as Gordon's Hospital. It now affords education to 120 foundationers, most of whom live outside the institution, and also teaches day scholars on payment of fees. Among other charitable institutions are the Boys' and Girls' Hospital, which maintains and educates about 100 boys and girls; a deaf and dumb institution, and an asylum for the blind. Board schools and other educational institutions are numerous. The U.F. Church theological college or hall has a principal and five professors. There are also normal schools of the Established and the Free Church. The Grammar School, already mentioned, is now under School Board management. The Duthie Public Park is a beautiful place for open-air recreation, and there are also public gardens. There are fine links between the mouths of the Dee and Don. The city is supplied with water taken from the river Dee about 25 miles up, the water-works having been opened by the queen in 1866. The Dee is crossed by two handsome stone bridges, besides a suspension bridge and a railway bridge. The Don is crossed near its mouth by a substantial stone bridge, and further up by the 'Auld Brig', or 'Brig o' Balgownie', a picturesque structure of one Gothic arch, erected it is said by King Robert Bruce. Aberdeen is the northern terminus of the Caledonian Railway, and the North British trains also run into the city. The Great North of Scotland Railway has its head-quarters here. The joint-station for the three lines now covers a large area. Among the manufactures woollens, especially winceys, linen and jute goods hold an important place. Combs are another important manufacture, one of the comb manufactories being the largest in the world. There are also chemical works, preserved-provision works, soap and candle works, breweries, &c. Granite was first polished in this city, and now there are many establishments for preparing that stone for all sorts of useful and ornamental work. Paper-making is actively carried on in the neighbourhood, and the largest envelope manufactory, it is supposed, in the world is here. There are foundries and other works, and iron shipbuilding is carried on in several yards. The fishing industry is of great importance, and a large number of steam trawlers in particular land their catches here. The herring fishery often employs about 400 boats in the season. The harbour accommodation includes two tidal basins inside the mouth of the river Dee, and two wet docks, entered through one of these basins, and together having an area of 34 acres. At the river entrance is a long granite pier on the north, and a breakwater on the south. Among modern harbour improvements have been the forming of a new channel for the river, the erection of the breakwater, the extension of the north pier, the construction of a graving-dock, &c. The harbour entrance is somewhat impeded by a bar. The principal imports are wheat, flour, coals, salt, flax, lime, guano, timber, and iron. Exports—linen, cotton, and woollen goods; paper, tinned meats, granite rough and cut, combs, fish, &c. Many cattle are sent by railway to London and other southern markets. The shipping trade

of the port has considerably increased of late years. In respect of shipping entered and cleared annually Aberdeen comes after Glasgow, Leith, Greenock, and Grangemouth. Regular communication by steam is maintained with London, Hull, Newcastle, Leith, Orkney and Shetland, &c. There is a lighthouse on Girdleness Point, a little south of the harbour entrance, exhibiting two fixed lights, one over the other, seen at a distance of 13 to 16 miles. —Aberdeen was already a place of importance early in the 12th century, when certain trading privileges were granted to it by David I. The first authentic charter was granted in 1179 by William the Lion, in which he confirmed the privileges and immunities enjoyed in the name of his grandfather. A provost is first mentioned in 1284. In 1329 Robert Bruce granted important privileges and immunities to the city, which henceforth increased in prosperity and often played an important part in the general history of the kingdom. Having been burnt by Edward III. in 1336 it was called New Aberdeen when rebuilt. Aberdeen obtained the position of a county in itself in 1899. As a parliamentary burgh Aberdeen returns two members to the House of Commons, being divided into North and South Aberdeen. Pop. in 1881, 105,189; in 1891, 124,943; in 1901, 153,503.

ABERDEEN, GEORGE HAMILTON GORDON, fourth EARL OF, a noted British statesman, was born at Edinburgh on the 28th of January, 1784, and succeeded to the title on the death of his grandfather in 1801. He was educated at Harrow School, and afterwards graduated at St. John's College, Cambridge, in 1804. He had previously, in 1801–3, travelled on the Continent, and had traversed Greece with all the enthusiasm of an ardent classical scholar, returning to England through Turkey and Russia. Shortly after he established the Athenian Society, so that Byron's description of him as 'the travell'd thane, Athenian Aberdeen', was not amiss. As the result of his classical studies and investigations he contributed an article to the Edinburgh Review on the topography of Troy, in which he somewhat severely handled Sir William Gell, and also wrote an introduction to Wilkins's translation of Vitruvius, giving an account of the progress of architecture in Greece, an essay subsequently published in a separate form in 1822, as An Inquiry into the Principles of Beauty in Grecian Architecture. In 1806 Lord Aberdeen entered Parliament as a Scottish representative peer, and was subsequently twice re-elected. In 1813 he was intrusted by the British government with a mission to Austria, for the purpose of inducing the emperor to join the coalition of sovereigns against Bonaparte, and in 1814 he signed the Treaty of Paris as one of the British representatives. In his diplomatic duties he acquitted himself entirely to the satisfaction of the government, and in 1814 he was created a British peer by the title of Viscount Gordon. On the termination of the war he returned to England, and from this period till 1828 occupied himself chiefly in the improvement of his estates. In 1828 he became chancellor of the Duchy of Lancaster, and a few months later foreign secretary in the Duke of Wellington's administration, and while in that capacity he had the satisfaction of seeing the achievement of Greek independence. He was a warm supporter of the bill repealing the test and corporation acts, a measure effected by the ministry under which he served, and he also advocated the bill for the emancipation of the Roman Catholics. During the short premiership of Sir Robert Peel in 1834–35 he acted as colonial secretary, and on the subsequent accession of Sir Robert to the premiership in 1841, again took office as secretary for foreign affairs. In 1840, during the struggle which rent in twain the Established Church of Scotland, he brought in a bill intended to heal the dissensions between the two ecclesiastical parties, but it was denounced by both. Again, after the Disruption in 1843, he introduced a bill for the removal of doubts regarding the admission of ministers to benefices in Scotland; but though it was passed into law that session, the measure failed to bring about any good result. He went out of office with Peel in 1846, and on the death of that statesman in 1850 he became the leader of the free-trade conservatives. On the inability of the Derby ministry to maintain its place Lord Aberdeen undertook the task of forming a cabinet, and accordingly returned to office in 1853 as head of a coalition ministry. The principal event which marks his administration is the Russian war; and in this his tardiness, and unwillingness to enter into hostilities, the result of his constitutional aversion to war, irritated the country, which deemed that the national honour had thus been compromised. In 1855 a majority of the House of Commons having decided for the appointment of a committee of inquiry into the conduct of the Crimean campaign, a motion which the Aberdeen ministry had uniformly resisted, the resignation of the cabinet ensued, and Lord Palmerston took the post of premier. This event marks the close of Lord Aberdeen's public career. He died in London on the 14th December, 1860.—His youngest son, ARTHUR, born in 1829, has had a distinguished career in the public service, especially as colonial governor (New Brunswick, Trinidad, Mauritius, Fiji, New Zealand, Ceylon), and in 1893 was raised to the peerage with the title of Baron Stanmore. He is author of the Life of Lord Aberdeen (1893), &c.—His grandson, JOHN CAMPBELL HAMILTON GORDON, seventh EARL, was born on Aug. 3rd, 1847, and educated at St. Andrews and Oxford. In 1870 he succeeded a brother in the title, and in 1877 he married a daughter of the first Lord Tweedmouth, who has been prominent in several public movements. In 1886 he was Lord-lieutenant of Ireland for a brief period under Mr. Gladstone; in 1893–98 he was Governor-general of Canada; in 1905 he again became Lord-lieutenant of Ireland.

ABERDEEN UNIVERSITY. This university derives its origin from two different foundations: one the University and King's College of Aberdeen, founded in 1494 by William Elphinstone, bishop of Aberdeen, under the authority of a Papal bull obtained at the instance of King James IV.; the other, Marischal College and University, founded in 1593 by George Keith, Earl Marischal, under a charter ratified by Parliament. The two foundations were united and incorporated into one university in 1860, as the University of Aberdeen, which ranks among the universities of Scotland as from the date of the foundation of King's College, 1494. As regards the university buildings see ABERDEEN (city). The quater-centenary of the university was celebrated in 1906, the new buildings being opened by King Edward VII. The university as a corporate body consists of a chancellor, rector, principal, professors, graduates and alumni, and matriculated students. Its government is administered by the University Court, the Senatus Academicus, and the General Council. The constitution and powers of these bodies, and the course of study for graduation, are similar to those of the other Scotch universities. The University Court, which is the supreme governing body of the university, consists of the rector, the principal, the Lord-provost of Aberdeen, and certain assessors, mostly elected by the Senatus and the General Council. The Senatus superintends the teaching and discipline of the university, and consists of the principal and professors. The General

Council consists of the chancellor, who is president, the members of the University Court and the Senatus, and the graduates of the university. It takes cognizance of matters generally affecting the university. The chancellor is the head of the university, and it is through him or his deputy, the vice-chancellor, who is appointed by him, that degrees are conferred on those found qualified by the Senatus Academicus. He is elected for life by the General Council. The rector is elected for a term of three years by the matriculated students, divided into four 'nations', according to their places of birth: 1, Mar, the city and neighbouring parishes; 2, Buchan, rest of the county and Banffshire; 3, Moray, the northern counties; 4, Angus, all not included in the other nations. Each nation chooses a procurator, and the rector is elected by the procurators; but should these be equally divided the election is decided by the majority of the students' votes. The professors are classified under the faculties of arts, divinity, law, science, and medicine, and most of them are appointed by the crown or the University Court. At present the chairs established in the arts faculty are those of Greek, humanity (Latin), moral philosophy, oriental languages, logic, English, history, mathematics, and natural philosophy. There are also lecturers in modern languages, agriculture, education, and several other subjects. The faculty of divinity includes the chairs of divinity and church history, oriental languages, divinity and biblical criticism, and systematic theology. The faculty of law is represented by three chairs. The faculty of medicine includes the chairs of chemistry, medicine, forensic medicine or medical jurisprudence, natural history, anatomy, surgery, materia medica, midwifery, physiology, pathology, and botany. There are not separate professors in the faculty of science. The regulations regarding degrees are now as in the other Scottish universities. Graduates in arts must attend classes and pass examinations in at least seven subjects, selected from four departments, viz. language and literature, mental philosophy, science, history and law, the course of study extending over at least three academic years. The degrees in all the faculties are open to women. There are a number of bursaries connected with the university, most of them being open to public competition. The total annual value of those held by art students amounts to about £4500, the value of each being from about £6 to £50 per annum. Scholarships and prizes are awarded yearly at the end of the curriculum. The university library contains about 100,000 vols. The number of students is annually about 800–900. The Aberdeen University unites with that of Glasgow in sending a member to the House of Commons. The degrees granted are M.A., B.D., M.B., M.D., Ch.B., Ch.M., B.Sc., D.Sc., D.Litt., D.Phil., B.L., D.D., LL.D.; the two last being honorary.

ABERDEVINE. See SISKIN.

ABERGAVENNY, a municipal borough and market-town of England, in the county of Monmouth, about 13 miles west by north of the town of Monmouth, is situated amid delightful scenery in the beautiful valley of the Usk, surrounded by hills, some of them nearly 2000 feet high, near where the Gavenny (a small stream) enters the river. The town (which is said to represent the *Gobannium* of the Roman period) has been so greatly improved in recent times as to have become quite modernized. It has a fine parish church with interesting monuments. Pop. in 1891, 7743; in 1901, 7795.

ABERNETHY, a town of Perthshire, Scotland, some eight miles to the south-east of Perth. It was an early seat of civilization, and was at one time the royal and ecclesiastical capital of the Picts. It has one of the two round towers found in Scotland. Pop. in 1891, 852; in 1901, 623.

ABERNETHY, JOHN, an eminent surgeon, was born on April 3rd, 1764, in London, as a boy was apprenticed at St. Bartholomew's Hospital, and afterwards became the pupil, and subsequently the friend of the celebrated John Hunter. In 1787 he became assistant-surgeon to St. Bartholomew's Hospital, and shortly afterwards lecturer on anatomy and surgery. In 1815–27 he was principal surgeon, and under his auspices the hospital attained a celebrity which it had never before enjoyed. He published Surgical and Physiological Essays; Surgical Observations; Surgical Works; and Lectures on Surgery, &c.; besides smaller essays. In one of his essays he gives an account of cases in which he had tied the carotid and external iliac arteries in aneurism, and the success of these bold and meritorious operations established his fame. The most important of his writings was The Constitutional Origin and Treatment of Local Diseases. He died on the 28th of April, 1831, at Enfield. He was noted for his eccentric habits and the roughness of his manner in addressing patients. Exercise and diet were his principal means of cure; and it was not uncommon for him to address sickly or dyspeptical patients of the higher classes thus—'Madam, keep your money to buy a skipping-rope!' or 'Sir, live on sixpence a day—and earn it!' Yet his roughness was all on the outside, for at heart he was sympathizing and generous, being known, in the midst of the most distinguished practice, to devote much of his time and talents to the poor and destitute.

ABERRATION OF LIGHT, an astronomical aberration; an observed displacement of the heavenly bodies explained as being caused by the velocity of light from those bodies being compounded with the velocity of the spectator in the earth's orbit. Suppose a line of railway running due north and south, and that the wind is blowing due east; an observer on an engine going north with the same velocity as the wind would feel the wind as blowing from the north-east—that is, the velocity of the engine compounded with an equal velocity at right angles to it produces an aberration of the *airt* or direction of the wind of 45°. The greater the velocity of the wind as compared with the velocity of the engine, the smaller the angle of aberration; and if the velocity of the engine and the angle of aberration are known, the velocity of the wind can be determined, and, conversely, knowing the velocity of the wind, that of the spectator can be found. The direction of a star is the *airt* of the light from the star, and the velocity of the light from the star being compounded with the velocity of the spectator in the earth's orbit at the time when the direction of the spectator's velocity is at right angles to the direction of the star gives an aberration of 20·5″; knowing, then, the spectator's velocity, we have the data for discovering the velocity of light, and knowing the velocity of light we have a means of determining the velocity of the spectator. A star in the pole of the ecliptic has a direction always at right angles to the motion of the earth, hence it describes a small circle 41″ in diameter in the course of a year about its true position; a star in the plane of the ecliptic appears to move along a right line 41″ in length; stars intermediate describe ellipses whose major axes are 41″. The velocity of the earth divided by the number representing the velocity of light is equal to the tangent of 20·5″.

ABERTILLERY, a town of England, in Monmouthshire, 16 miles north-west of Newport, with collieries and tin-plate works. Pop. (1901), 21,955.

ABERYSTWITH, a seaport, municipal and par-

liamentary borough, and fashionable watering-place of Wales, in the county of Cardigan, and 33 miles north-east of the town of that name on Cardigan Bay. The chief buildings are various places of worship; the University College of Wales, a fine Gothic structure (this college is now one of those united to form the University of Wales); Alexandra Hall for lady students; the custom-house, assembly-rooms, town-hall, free library, baths, hotels, &c. The Marine Parade is an elegant crescent, and the Marine Terrace a fine range of buildings. The town is much resorted to for sea-bathing, and has many attractions for visitors. The ruins of the castle, dating from the twelfth century, on a bold promontory a little to the west, are picturesque; and the public walks command extensive views, and are much admired. The harbour is frequented chiefly by coasting vessels. There are enamelled slate works, foundries, breweries, &c. Pop. in 1901, 8013.

ABEYANCE, in law, the condition of a fee or inheritance which is not actually vested in any one, but is in a manner waiting to vest in the person who shall first satisfy the conditions of the tenure by which it is held. Its most familiar use at present is in regard to titles of honour, which, being descendible to heirs general, fall into *abeyance* when the holder dies leaving only daughters. In this case the title is not properly extinct, because it is optional with the crown to keep it alive, or at least to revive it, by conferring it on one particular daughter, or the male issue of one, to the exclusion of the others.

ABGAR, a name common to many rulers of the Kingdom of Osrhoëne in Mesopotamia, which was bounded by the rivers Euphrates and Chaboras, and the range of Taurus, and had its capital at Edessa. The kingdom was founded in the second half of the second century B.C., and was destroyed in the early part of the third century A.D., in the reign of the emperor Caracalla. One of the kings of this name, who lived during the reign of the Emperor Tiberius, has acquired some celebrity in connection with a letter which he was said to have written to our Saviour, requesting him to come and cure him of a disease under which he was labouring. The spuriousness both of the letter and of an alleged answer to it has been proved, and is generally acknowledged, but ancient likenesses of Christ claimed to be taken from a portrait which was said to have been sent to the king on the same occasion.

ABIES. See FIR and SPRUCE.

ABINGDON, a municipal and formerly a parl. borough of England, in Berkshire, 50 miles north-west of London, on the right bank of the Thames. It has a handsome market-house, two parish churches, one of them a large Gothic edifice with a fine spire, and several other places of worship. There is a grammar-school, situated in the public park, with eight scholarships to Pembroke College, Oxford. The industries are not important. Abingdon is an old town, and derives its name from an abbey established at a very early date. It was an important place in Anglo-Saxon times, and Offa, king of Mercia, had a palace here. It now gives name to a parliamentary division of the county; pop. 49,000. Pop. of mun. bor. in 1881, 6755; in 1891, 6557; in 1901, 6480.

ABIOGENESIS, the generation of living from non-living matter. See GENERATION (SPONTANEOUS).

ABJURATION, OATH OF. See OATH.

ABLATIVE, the name of a case in the declension of nouns, adjectives, and pronouns. Its root signification is that of place whence or where. Closely akin to this is that of time when, which it is also used to indicate. From this fundamental meaning arise those of cause, means, instrument, or manner. This case is found in only a few of the Indo-European languages, for example, Sanskrit, Latin, and Old Slavonic. Such adverbial phrases as 'the enemy having been defeated', in the sentence, 'The enemy having been defeated, the general pitched a camp', are expressed in Latin by what is called the ablative absolute ('Hoste victo, dux castra posuit'); but in reality such ablatives always express some circumstance, such as time, manner, cause, &c., which it is the proper function of the ablative to express. In similar cases the Sanskrit uses the locative case, the Greek the genitive.

ABLUTION. See PURIFICATION.

ÅBO, the capital of the government of Åbo Björneborg in Russian Finland, on both sides of the Aurajoki, not far from its mouth in the Gulf of Bothnia, was founded by the Swedes in 1157, and was the capital of all Finland till 1819, when it was supplanted by Helsingfors. It consists of regular, spacious, and well-paved streets. It has also several squares, the finest of which is that in which the ancient cathedral stands. Åbo is the see of a Protestant archbishop, and the seat of a court of appeal for South Finland; it carries on various industries, and has a considerable trade, particularly in timber. Owing to the shallowness of the harbour, large vessels are obliged to lie 3 miles below. By the peace of Åbo (17th August, 1743), which terminated the war begun in 1741 by Sweden against Russia, the province of Kymmenegård, with several fortresses, was handed over by the former to the latter. Here also the treaty between Russia and Sweden concluded in 1812 was ratified. Pop. (1909), 49,377.

ABOLITION, ABOLITIONISTS. See SLAVERY.

ABOMEY, or ABOMEH, capital of the Kingdom of Dahomey, in West Africa, now belonging to the French, is situated in a fertile district about 62 miles from the coast. It is simply a large negro village, and consists mostly of slightly built huts. A small French garrison and resident are stationed here. The French occupied it in 1892. Pop. estimated at about 20,000.

ABORIGINES, the name given in general to the earliest known inhabitants of a country, those who are supposed to have inhabited the land from the beginning (*ab origine*). The word is Latin, and if this, which is the most probable derivation, be accepted as correct, it closely corresponds to the Greek *autochthones* (from the ground itself). The name was applied by the Romans in the first instance to the early inhabitants of Latium.

ABORTION, the expulsion of the fœtus before it is capable of independent existence. This may take place at any period of pregnancy before the completion of the twenty-eighth week. A child born after that time is said to be premature. Abortive children are not necessarily still-born, but although they may live for a short time after birth they are not capable of continuing in life. Abortion takes place most frequently in the first three months of pregnancy, and especially in the third month. It may take place soon after conception. It is most common at the periods when menstruation would have occurred had the woman not been pregnant. Abortion may be the result of the general debility or ill-health of the mother (syphilis is a frequent cause), or on the contrary of a plethoric constitution; it may also be due to special affections of the uterus (disease or displacement), or morbid conditions of the ovum or placenta, or to external influences, such as severe exertions, sudden shocks, and violent emotions. In general abortion is produced by any circumstance that either directly or indirectly destroys the life of the fœtus. Various medicinal substances, generally violent emmenagogues, or drastic medicines, are believed to have the effect of provoking abortion, and

are sometimes resorted to for this purpose. The symptoms of imminent abortion in pregnant women include all the indications of extreme physical weakness and distress, together with such special symptoms as spasmodic muscular movements in the region of the loins, a frequent tendency to make water, and a flow of blood and other fluids from the genital organs. Women who have once aborted are specially liable to a repetition of the accident, and must therefore exercise particular care about that period of their pregnancy when their former miscarriage or miscarriages occurred, whether there are symptoms of another miscarriage or not. They must enjoy perfect rest both of body and mind, maintain a horizontal position in a room of moderate and uniform temperature, and abstain from all exciting food and drink, and active medicines. In some very rare cases physicians find it necessary to bring about abortion by artificial means in order to save the life of the parent. In English law the using of any poison or other noxious thing, or of any instrument, to procure abortion, is a felony, whether these means be used by the woman herself, or any other person; and the guilty person is liable to penal servitude for life or otherwise, or imprisonment. The procuring of any poison, or other noxious thing, or of any instrument, in the knowledge that such poison, or noxious thing, or instrument is intended to be used to procure abortion is a misdemeanour punishable with penal servitude or imprisonment (24 and 25 Vict. cap. c. s. 58, 59). In Scotland there is no statute condemning the practice of abortion, but it is an offence that may be dealt with by common law, the punishment being penal servitude or imprisonment.

ABORTION, a term in botany, denoting the suppression by non-development of one or more of the parts of a flower, which consists normally of four whorls—namely, calyx, corolla, stamens, and pistil. In the earliest stage of development all the parts of the floral whorls are regular and symmetrical. Modifications in their regularity and symmetry depend on changes occurring during their growth, as by the adhesion of one part to another, the union of different whorls, the entire abortion or disappearance of some parts, and the multiplication of others.

ABOUKIR, a small village on the Egyptian coast, 10 miles east of Alexandria. Aboukir Bay is celebrated for the naval battle in which Nelson annihilated the French fleet between the 1st and the 2d of August, 1798. The latter sailed on May 19, 1798, from the harbour of Toulon, to convey an army to Egypt under the command of Bonaparte. As soon as the English admiral, St. Vincent, who was cruising before Cadiz, received information of this, he despatched Rear-admiral Nelson with fourteen ships of the line to the Mediterranean with orders to seek and attack the French fleet. On August 1 Nelson caught a glimpse of the French ships in the road of Aboukir, and gave the signal of battle. Although the French fleet was anchored in a curved line, close inshore, Nelson ordered half of his force to sail in between the enemy's ships and the land so as to take them in the rear, while the other half approached their front and anchored within pistol-shot; thus the French ships were attacked from all sides. At sunset about half-past six o'clock in the evening the battle began. At the end of an hour five French ships were dismasted and taken. The French admiral, Brueys, was killed by a cannon-ball; his ship, *l'Orient*, however, continued the battle with great spirit until she took fire. About ten o'clock this splendid vessel of 120 guns—supposed to be equal to any two of the British ships—blew up. Of 1000 men, but seventy or eighty were saved. Captain Casabianca was mortally wounded, and his son, a boy twelve years old, voluntarily remained in the burning ship and shared his fate. The other ships continued the cannonade till the morning, which witnessed the entire defeat of the French fleet. But two ships of the line and two frigates escaped to Malta and Corfu; nine ships of the line were taken, one blown up, and another, together with a frigate, burned by the French themselves; one frigate, however, was sunk. Thus the naval power of France in the Mediterranean was for a time annihilated, and the British flag waved triumphant from Gibraltar to Alexandria. This decisive victory gained Nelson the title of Baron Nelson of the Nile; and the battle is often spoken of as the battle of the Nile. Two important land engagements were also fought near Aboukir. In the first, fought on the 25th of July, 1799, Napoleon defeated the Turks under Mustapha; in the second, fought March 8, 1801, Sir Ralph Abercromby effected the landing of a British army against the opposition of the French. See ABERCROMBY (SIR RALPH).

ABOU SAMBOUL. See IPSAMBOUL.

ABRACADABRA, a mystic or cabalistic word formerly believed to have the power of curing fevers, &c. At present it is used in a loose sense as equivalent to spell, charm, hocus-pocus, &c. According to Q. Serenus Sammonicus (second century), it ought to be written so as to form a triangle, in order to produce the supposed effect, as here shown:—

A B R A C A D A B R A
A B R A C A D A B R
A B R A C A D A B
A B R A C A D A
A B R A C A D
A B R A C A
A B R A C
A B R A
A B R
A B
A

Thus written on any material it was worn as an amulet.

ABRAHAM. See JEWS.

ABRAHAM À SANCTA CLARA, a German pulpit orator, born in Krähenheimstetten, in Suabia, in 1642. His true name was Ulrich Megerle. At Marienbrunn, in the south of Austria, he joined, in 1662, the barefooted friars of the order of St. Augustine, applied himself to philosophy and theology in a monastery of his order at Vienna, was then employed as preacher in the convent of Taxa, in Bavaria, and acquired so great a reputation that in 1669 the Emperor Leopold I. invited him to the court of Vienna, where he continued till the year 1709, when he died, sixty-seven years old. His sermons are burlesque, and full of the strangest notions. His striking peculiarities, however, according with the spirit of the age, procured him large audiences, and his sermons were not without effect, since they treated of popular subjects, and were seasoned with much sarcasm, adapted to all ranks. The titles of some of his writings show the tone in which they are composed: as, Fy on the World, or about Virtue and Vice; Salutary Mixture; Abraham à Sancta Clara's Nest of Newly-hatched Fools, or Curious Workshop of Various Fools, both Male and Female, &c. His whole works have been published in twenty-one vols. (Passau and Lindau, 1835–54).

ABRAM, a town of England, in Lancashire, 3½ miles to the south-east of Wigan, in a colliery district. Pop. in 1901, 6306.

ABRANTES, a town of Portugal, on the right bank of the Tagus (which is crossed by a suspension bridge), in the province of Estremadura, district of Santarem, 73 miles north-east of Lisbon. It stands on a height surrounded by gardens, vineyards, and olive-yards. The Tagus is here navigable, and Abrantes is an entrepot for the products of the adjacent provinces, and carries on an active trade with Lisbon by rail and river. This place gave the title of duke to general Junot. Pop. (1900), 7260.

ABRANTES, Duke of. See Junot.

ABRAXAS (or Abrasax) STONES, the name given to a species of stones or gems, cut into almost every variety of shape, but generally having a human trunk and arms, a cock's-head, two serpents' tails for the legs, &c., and the word Abraxas or Abrasax in Greek characters engraved upon them. They have been found in Egypt, Syria, and Spain, and are so common that almost all cabinets possess them. They are said to have been made at Alexandria, which accounts for their often bearing the types of Egyptian deities and sacred animals. They often bear also other inscriptions besides the word Abraxas or Abrasax, and although these are always in Greek characters they belong to various languages—Coptic, Hebrew, Aramaic, Chaldee. They appear to have been first used by the Gnostic sect of Basilidians, passed from them to the Priscillians, became afterwards general symbols of Gnosticism, and were widely adopted by the sects addicted to magic and alchemy. They are rudely executed, and most of them were probably made during the middle ages, to be used as talismans. Many of them were evidently designed to be set in signet rings.

ABROGATION, the repealing of a law by a competent authority. In England a law can lose its force only by being expressly or implicitly repealed, unless it was passed only for a certain period, in which case it of course ceases to be valid as soon as that period expires. A law is implicitly repealed when another law is subsequently passed the provisions of which are inconsistent with the first. A law expressly repealed does not revive when the repealing law is repealed (13 and 14 Vict. cap. xxi. s. 5, 6). In Scotland an act of Parliament passed before the Union may lose its validity not only by being expressly abrogated, but by what is called passing into desuetude (disuse). For this it is not enough that the law shall not have been used during a lengthened period, but it is necessary that a practice contrary to the law shall have been long prevalent, showing that it was the intention of the community that such law should be held as repealed. The king and council might revive an old law, but, according to Erskine, only in those cases in which a contrary practice had not prevailed for a sufficient length of time to constitute a virtual abrogation of the law.

ABRUS, a genus of papilionaceous plants of the order Leguminosæ, with a bluntly four-lobed calyx, the upper lobe broadest; and an oblong, compressed pod, containing from four to six seeds. The only species, *Abrus precatorius*, is a delicate twining shrub found in the East Indies, where it is certainly indigenous, and in tropical parts of Africa and America, where it may have been imported, and takes its name of *precatorius* from the frequent use of its seeds as beads for rosaries, for which purpose they are brought from Guinea and the East and West Indies. In the common variety they are red with a black spot, but in other varieties variegated. The leaves and roots secrete a juice very similar to that of the liquorice plant, and sometimes substituted for it; and hence in the West Indies the whole plant is known by the name of wild liquorice.

ABRUZZI, the name of what was formerly the northern port of the Kingdom of Naples, comprising the provinces of Abruzzo-Citra, Abruzzo-Ultra I, and Abruzzo-Ultra II—now named Chieti, Teramo, and Aquila; area, about 4900 square miles. The sea-coast extends about 80 miles along the Adriatic, and does not possess a single harbour. The interior is extremely rugged and mountainous, being traversed throughout by the Apennines, whose lofty summits, Monte Corno (upwards of 9500 feet high), the culminating point of the chain, and Monte Magella and Monte Velino (both above 8000 feet), are all within it. The principal rivers are the Tronto, Pescara, and Sangro; there are no lakes worth notice, Fucino or Celano having been drained. The climate and soil necessarily vary much with the nature of the surface. The loftier summits are covered with snow from October to April, and many of them retain a very bleak appearance at all seasons; others are finely wooded, or covered with verdant pasture. Between the ridges are numerous fertile plains and valleys, which yield large quantities of corn, wine, oil, liquorice, almonds, saffron, &c. The inhabitants have fine physical forms, but are regarded as indolent, sullen and vindictive, and much given to predatory habits; they have few manufactures, and little trade. The three provinces of the Abruzzi, together with the province of Campobasso or Molise, form a government (*compartimento*) of the Kingdom of Italy, with an area of 6677 square miles, and a pop. on the 1st Jan., 1904, of 1,296,380.

ABSALOM, more properly Axel, one of the most eminent prelates, statesmen, and warriors of whom Denmark can boast, was born of an illustrious family, in the island of Seeland, in 1128, completed his studies at the University of Paris, and shortly after his return became Bishop of Roeskilde, and the intimate friend and counsellor of his sovereign Waldemar I., whose reign derived much of its lustre from the wise policy suggested and the warlike exploits achieved by Absalom. Among the latter may be mentioned his clearing the sea of the Slavonic pirates who had long infested it, and his successful siege of their stronghold Arkona, in the island of Rügen, where they had accumulated immense stores of plunder, and erected a vast temple to their principal divinity, Svantevit. After the death of Waldemar, who had promoted him to the archbishopric of Lund, he enjoyed equal favour under his successor, Canute VI., and secured the independence of the kingdom by defeating a powerful fleet which the Emperor Barbarossa sent against it under Bogislas, duke of Pomerania. The castle of Axelborg, the original nucleus of Copenhagen, was built by him, and he is therefore justly regarded as the founder of the Danish capital. To his honour also it ought to be mentioned that the cares of state and din of war were not able to absorb his thoughts, and that he not only caused the History of Denmark to be drawn up by the eloquent Saxo Grammaticus, and the learned Sueno Aagesen, but was himself the principal compiler of the Code of Laws published by Waldemar, and author of the Ecclesiastical Code of Seeland. He died in 1201 or 1202 at the age of seventy-three, and was buried at Soröe, where he had founded a monastery, and where his tomb is still seen. It was opened in 1827, when his episcopal staff and ring were found.

ABSCESS, any collection of purulent matter or pus formed in some tissue or organ of the body, and confined within some bag or limited inclosure. In size it may vary from a grain of millet to that of the head or even more, and its serious nature is generally proportioned to its dimensions, though there are exceptions to this rule, as in abscesses in the transparent cornea, the globe of the eye, the brain, &c., which,

however small, are always dangerous. The most common seat of abscess is the cellular tissue, more especially the subcutaneous, and those parts where it is most abundant and most relaxed. Abscesses are either acute or chronic, the latter generally occurring in persons of a weak or scrofulous habit of body. A healthy acute abscess first indicates its formation by heat and tenderness of the part followed by a throbbing pain, and when seated near the surface is accompanied by an inflammatory swelling of the skin, which gradually becomes thinner until it bursts, and the matter escapes. Abscesses, however, sometimes burst inwardly. After bursting the pain of the abscess is relieved. Chronic abscesses may last for weeks and months, but are not so painful as acute abscesses. The mode of treatment necessarily varies according to the source of the abscess and its locality, but it ought to be known that the application of irritant poultices, such as honey, soap and sugar, &c., is always hurtful. Poultices applied to abscesses should be thick, soft, and warm. Bread and linseed are among the best. Fomentation with hot water, when the first symptoms of an abscess are detected, together with the administering of purgative medicine, is sometimes sufficient to prevent its formation, and is always of service.

ABSENTEE, the name which has been given to a person who possesses property in one country, and resides and spends his income in another. A problem of some interest in political economy is to determine the effect produced on the country from which the proprietor thus absents himself. M'Culloch maintains that it is a matter of indifference where the rent of land is spent; and that, for example, an Irish landlord, in so far as pecuniary advantage only is concerned, benefits Ireland as much by spending his rents in Paris as he could do by spending them in Dublin, or the mansion-house of his estate. This view finds few supporters; and, indeed, it is clear that in the case instanced, those persons in Ireland who would have got a profit by supplying the landlord's wants had he lived in Ireland, must lose that profit. But whatever doubt there may be as to the direct pecuniary injury which a country suffers from absenteeism, there can be no doubt that the land in a country afflicted with absenteeism suffers from the want of the personal supervision of those who are most concerned in looking after its interests.

ABSINTHE, a liqueur much drunk upon the Continent, especially in Paris, which consists of an alcoholic solution strongly flavoured with an extract of several sorts of Artemisia or wormwood. It stimulates the digestion and circulation, and is taken before meals as a whet for the appetite; but if drunk too freely induces headache, vertigo, &c. Its use is especially pernicious in the case of persons of a highly sensitive or irritable temperament, or in whom there is reason to suspect or to fear the inflammation of some organ.

ABSOLUTION, in an ecclesiastical sense, usually means the remission or forgiveness of a penitent person's sins. According to the Roman Catholic doctrine, absolution 'is a remission of sin which the priest, by authority received from Christ, makes in the sacrament of penance. It is not a mere announcement of the gospel, or a bare declaration that God will pardon the sins of those who repent, but, as the Council of Trent defines, it is a judicial act by which a priest, as judge, passes sentence on the penitent' (Addis and Arnold's Catholic Dictionary). The Roman Catholic ritual accordingly prescribes for it the form, 'I absolve thee from thy sins, in the name of the Father, and of the Son, and of the Holy Ghost'. Some authorities (even among the Roman Catholics) have maintained that this absolute or *indicative* form is not essentially necessary, and that a *precatory* form ('May Christ absolve thee', or the like) is sufficient, and was for long the only form used, as is still the case in the Greek Church. Some maintain also that, originally, absolution was the act by which a member of the church, after being excluded from the Lord's Supper on account of some flagrant sin, was readmitted to communion after a public profession of penitence, and the performance of the penance imposed on him by the church, the priest (presbyter) announcing to the penitent in the presence of the congregation his remission from ecclesiastical punishment. Among Protestants different views are held with regard to absolution. The Book of Common Prayer contains two forms of absolution, one in the morning and evening service, another in the communion office.

ABSORBENT, the name applied to the system of minute vessels, by which food and other matters are carried into the circulation of vertebrate animals. The vessels consist of two different sets, given off as it were from a common stem, and called respectively *lacteals* and *lymphatics*, the one from the whiteness and the other from the transparency of the fluid which they convey. See LYMPH.

ABSTINENCE is the refraining from indulgence in certain things or articles of food which are agreeable to our fancies or appetites, as from alcoholic liquors. In an ecclesiastical sense abstinence is the refraining on certain days or at certain times from particular kinds of food, and is thus distinguished from fasting, which is limiting the quantity of food taken. The refraining from eating flesh meat on Fridays, as is practised among Roman Catholics and others, is an instance of abstinence in this sense, the intention being thereby to mortify and restrain the passions. But by abstinence, in a general sense, is also understood a sparing indulgence in diet, somewhat below what is generally considered the usual standard. In medical writings various instances are recorded of persons who have employed abstinence as a means of curing or alleviating certain ailments; and a book is in existence, written by Cornaro, a nobleman of Venice, giving a very extraordinary account of his own particular case, and of the great benefit he had derived from the employment of abstinence. Having been, at the age of forty, abandoned by his physicians, who pronounced his recovery hopeless, he gave up medicine and betook himself to a very spare regimen, by means of which he was enabled to vanquish all his complaints, and attain to the age of ninety-nine years; thereby passing the latter half of his life in a degree of ease and comfort which he had never before experienced. Few persons, probably, are aware with what facility life may be supported upon a very slender diet. The primitive Christians of the East, who were induced to flee to the desert to escape from their heathen persecutors, attained to very advanced periods of life, living cheerfully and healthily upon a daily allowance of coarse bread, with a beverage of water only. It is true that many persons have irreparably injured their constitutions by excessive parsimony; and it has been said that those who, either from design or accident, have fasted too long or too often, seldom enjoy good health afterwards; but this can only apply to such as absolutely fast altogether, not to those who are only very moderate in the use of food. The subject of partial or total abstinence from alcoholic liquors is treated of in the article TEMPERANCE SOCIETIES.

ABSTRACTION, the operation of the mind by which it disregards part of what is presented to its observation in order to concentrate its attention on

the remainder. It is thus the correlative of attention, the one implying the other. We attend to those things from which our mind is not abstracted, and there is abstraction of those things to which our attention is not directed. The power of continuous abstraction or of continuous attention is essential to the prosecution of any study involving profound investigation, and is in a great measure the result of habit. Dugald Stewart held that the mind is capable of attending to only one thing at a time; but the slightest consideration is enough to satisfy any one that this view must be erroneous. Without the power of attending to at least two objects at a time all comparison would be impossible; for when the mind compares, the objects of comparison must be simultaneously present to it, either as perceived or as remembered; and whether a thing is attended to as perceived or as remembered makes no difference as to the fact of attention. Abstraction is the foundation of the operation of generalization. In order, for example, to form the conception of a horse, we disregard the colour and other peculiarities of the particular horses observed by us, and attend only to those qualities which all horses have in common. In rising to the conception of animal we disregard still more qualities in a horse or any other animal, and attend only to those qualities which all animals have in common with one another.

ABSURD, a word commonly used in logical argumentation for what is inconsistent with reason. The term *reductio ad absurdum* (reduction to absurdity) is commonly applied to a mode of argument by which the falsity of a supposition is proved by showing that the supposition leads to consequences directly at variance with what is universally admitted to be true. In elementary geometry it is applied to a mode of establishing a proposition, which consists in showing that to suppose the proposition false involves a contradiction. Thus Euclid proves the proposition that in a triangle equal angles are subtended by equal sides, by showing that if we supposed this not to be the case, we should be able with the help of propositions previously established to prove that one triangle is equal to another of which it forms only a part. As this consequence cannot be accepted as true, it follows that the supposition that led to it must be false, and hence that the original proposition must be true.

ABUBEKR, or FATHER OF THE VIRGIN, the name generally applied to the father-in-law and first successor of Mohammed, who married his daughter Aïsha or Ayesha. After Mohammed's death in 632, his right to the succession was contested by Ali, Mohammed's son-in-law, and though the dispute was settled without bloodshed in Abubekr's favour, the adherents of Ali were not satisfied, and a schism took place which divided the Mohammedans into the two great sects of Sunnites and Shiites; the former maintaining the validity of Abubekr's, and the latter that of Ali's claim. Abubekr, in his wars with the Arabs, Syrians, and the Greek emperor Heraclius, was invariably successful. He died in 634, and was buried beside his daughter and Mohammed.

ABULFARAGIUS, GREGORIUS (sometimes called *Bar-Hebræus*, that is, son of the Hebrew), a distinguished scholar, author of numerous works in Arabic and Syriac, was born in Armenia in 1226, and died in 1286. Under the guidance of his father (a highly cultivated Jewish physician who latterly became a Christian) he made extensive acquirements in various branches of learning and science. About 1253 he was ordained Bishop of Aleppo, and about 1264 was appointed *maphrian* of the Jacobite Christians, the highest rank in that body after that of patriarch. His works, a number of which are yet unpublished, embrace history, theology, philosophy, medicine, grammar, &c. Among them may be mentioned his Syrian Chronicle, in three parts, the first of which relates the political history of the world from Adam to his own times; the other two containing the history of the Jacobite and Nestorian Christians. The first part was published in the eighteenth century (Syriac and Latin, Leipzig, 1789), and again in 1890; the second and third parts in 1872–77 (Louvain, 3 vols.). Abulfaragius composed an abridgment of his larger history with the title, Abridged History of the Dynasties (published by Pococke, in Arabic and Latin, Oxford, 1663). His commentaries on the Bible have only been published in extracts.

ABULFEDA, EMAD ED-DIN ISMAIL, Arabic writer, Prince of Hamah, in Syria, surnamed the *Victorious King* and the *Pillar of Religion*, and famous as an historian and geographer, was born at Damascus in A.D. 1273. He sprung from the same family which had given birth to the famous Saladin. While a youth, he distinguished himself in various campaigns. From his cousin he inherited the principality of Hamah, which he held with the title of king as a vassal of Egypt from 1310 till his death, in 1331. All writers who mention him represent him as a prince of the greatest talents, equally remarkable for courage and coolness in war, and for wisdom in council. Amid the cares of government he devoted himself with zeal to study, drew the learned around him, and rendered his power and wealth subservient to the cause of science. He was well acquainted with history, jurisprudence, medicine, botany, mathematics, and astronomy, and has left the fruits of his inquiries in several valuable works. Of these the most famous are his Annals, or general history of the world down to 1328, of which the portion dealing with the Moslem period was published by Reiske at Copenhagen between 1789 and 1794 (5 vols.), while the ante-Mohammedan portion was published by Fleischer in 1831; and his geography entitled The True Situation of Countries (edition by Reinaud and MacGuckin de Slane, Paris, 1837–40; also translated into French).

ABUSHEHR. See BUSHIRE.

ABUTMENT, the part of a pier or wall which receives and resists the lateral outward thrust of an arch, and from which it may immediately spring. When the arch is semicircular, the name of *impost* is given to each of the piers or parts of a wall on which the extremities of the arch rest.

ABYDOS, an ancient Greek city of Asia Minor, which once stood on the eastern shore of the Hellespont (Dardanelles), at a part of the strait nearly opposite Sestos, founded by the people of Miletus about 700 B.C. Xerxes here built his bridges of boats for the invasion of Greece, and here Alexander's army under Parmenio crossed from Europe to Asia. Leander, say ancient writers, swam nightly from Abydos to Sestos to see his loved Hero; a feat in swimming once successfully accomplished also by Lord Byron. The exact site of the ancient Sestos is not known with certainty.

ABYDOS (the modern *Arabat el Matfoon*), an ancient city of Upper Egypt, about 6 miles west of the Nile, formerly a large and important place. Even in the time of Strabo Abydos was reduced to a mere village, yet its ruins still testify its former grandeur. It was a residence of the Egyptian monarchs, and the reputed burying-place of the god Osiris; in consequence of which belief, the bodies of many Egyptians were brought from a great distance in order to be interred within its sacred precincts. The Memnonium, or temple of Sethi I. father of Rameses II., and the temple of Rameses II., both dedicated to Osiris, and both finely decorated, constitute the chief remains of this once magnificent city. In the former of these was discovered, in 1865, the famous Abydos tablet, which gives a list of 76 Egyptian kings from

Menes to Sethi I. A fragmentary tablet of similar character was discovered in the other temple in 1818, and is now in the British Museum. In a cemetery to the north of Abydos are various antique sepulchral monuments, which have yielded many objects of interest.

ABYSSINIA, or HABESH, an ancient kingdom of eastern Africa, now under a monarch who claims the title of emperor. Its limits have been variously defined by different authorities, and cannot indeed be said to be definitely settled. If we exclude the country of the Gallas on the south, Abyssinia may be said to extend between lat. 8° and 16° N., and lon. 35° and 41° E., having Nubia north and west, the Soudan west, the Red Sea littoral (Erythræa, Danakil country, &c.) east, and to the south the Galla country just mentioned. The area within these limits is about 160,000 square miles, but the present ruler claims a much more extensive territory; and latterly Abyssinia has come to be surrounded by regions belonging to or influenced more or less by Italy, France, and Britain. The principal divisions of Abyssinia are the provinces or kingdoms of Shoa in the south, Amhara in the centre, and Tigré in the north, to which may be added Lasta, Gojam, &c.; total area, about 350,000 sq. miles. Addis Abeba (in Shoa) is the chief residence of the ruler, but the Abyssinian royal residences largely consist of slightly-built houses, and resemble more or less permanent camps. Other towns are Gondar, Adua, and Ankober. The more marked physical features of the country may be described generally as consisting of a vast series of table-lands of various and often of great elevations, and of numerous ranges of high and rugged mountains, some of them of very singular forms, dispersed over the surface in apparently the wildest confusion. From these mountains flow inexhaustible supplies of water, which, pouring down by the deep and tremendous ravines that everywhere intersect them, impart an extraordinary fertility to the plains and valleys below. The chasms or rents that occur in the plateaux are often of appalling depth, forming gloomy abysses or cañons whose edges are frequently not more than 200 or 300 yards asunder. Notwithstanding, however, the wild and rugged appearance of the country generally, it contains numerous valleys and tracts of unequalled beauty and fertility, rich in all the most valued productions of the earth. Many of these favoured districts are spoken of with rapture by travellers, both as regards the luxuriance of their vegetation and the salubrity of their climates. The most extensive is the plain of Dembea, lying round the lake of that name, emphatically called the granary of the country, where there reigns a perpetual spring. The most remarkable and loftiest mountain summits occur in the centre of the north part of the kingdom, immediately to the west of the river Tacazzé. Among the highest of these (so far as known) is Ras Dashan, which has an elevation calculated at 15,167 feet, and is capped with perpetual snow. Abba Yared and Buahit are estimated to be even higher. Along the whole of the east side of the country extends a mountain range or escarpment forming a natural rampart with a mean elevation of 7000 or 8000 feet for a distance of some 600 miles. No volcanoes are known to exist at present, but almost everywhere are numerous evidences of past volcanic action. Perhaps the principal river of Abyssinia is the Tacazzé, which has its rise in the mountains of Lasta, about lat. 12° N.; lon. 39° 20′ E. It pursues a northern then a western course, and after leaving the bounds of Abyssinia takes the name of Atbara, and finally joins the Nile. At 10 miles from its source it flows in a deep valley, the bed of the river being about 7800 feet and the summit of the plateau on its southern bank 10,700 feet above the level of the sea. It takes its name, Tacazzé, 'The Terrible,' from its impetuosity. The chief of the other rivers—if not indeed the chief river of the country—is the Abay or Abai in the south-west, which after entering and leaving Lake Dembea flows southwards and then north-westwards, and latterly takes the name of the Bahr-el-Azrek or Blue Nile, of which it really forms the upper portion. In the earlier part of their courses, while flowing over the level surfaces of the table-lands, the rivers of Abyssinia are little better than muddy brooks, which in the dry season nearly disappear, but during the rains overflow their banks and inundate the plains for miles. The principal lake of Abyssinia is Lake Tana or Dembea just mentioned, in the territory of Amhara, a large and beautiful sheet of water at a height of upwards of 6000 feet above the sea. It is about 46 miles in length, and about 33 in breadth at the widest part. Lake Haik, in the province of Amhara, on the northern confines of Shoa, is about 45 miles in circumference. Lake Ashangi, in Tigré, 8200 feet above the level of the sea, is 4 miles long and 3 miles broad, bordered by a richly cultivated plain surrounded by mountains, and is a rare instance of a fresh-water lake without any apparent outlet. The chief mineral products of Abyssinia are iron, sulphur, coal, and salt. Coal beds appear to extend along the whole of the eastern frontier of Shoa, but as a combustible coal is scarcely known in the country. Salt is obtained in various places, especially from a salt plain on the south-eastern border of Tigré. In some parts the incrustation is 3 feet deep. Rock-salt cut into pieces somewhat resembling a scythe whetstone in size and shape, is used as a medium of exchange in parts of the country. These *amolés* as they are called are cut from the shores of Lake Assal (in Obok territory), where their intrinsic value is exceedingly small, but they become valuable when carried inland. Gold is obtained from alluvial deposits but not in great quantity. A few hot mineral springs are known and made use of. The climate of Abyssinia is as various as its surface. In the valleys it is delightful, but on the mountains often cold. In the confined lower districts the intensity of the heat gives rise to noxious malarial exhalations. The rains begin in June and continue till September (over a considerable portion of the country at least), during which period they are often so violent as to put a stop to agricultural labour and all other out-door operations. The finest months of the year are those of December and January.

As in other mountainous countries within the tropics, the zones of vegetation are here a marked feature. From the sea-level to a height of 3000 feet the vegetation is of a tropical character; from 3000 up to 6000 feet a subtropical zone extends, in which grow lobelias, acacias, &c.; and from that to 9000 feet the flora is of a temperate or even English character, the dog-rose, cowslips, violets, lavender, and wild thyme being quite common. The principal grains are millet, barley, wheat, maize, and teff. Teff (*Poa Abyssinica*), a very small seed, is a favourite with all Abyssinians. The bread made from it is soft and spongy, with a sourish taste, and is said to be unwholesome, though not unpleasant to the taste. Two crops are obtained yearly, the seed being sown in one field while the crop is being gathered in the next. In some places there are three harvests within the year. Large quantities of a kind of banana called *ensete* are raised, and produce an agreeable sort of bread. Among the other vegetable products of the land may be mentioned ebony, coffee, gum, balsam, incense, and various medicinal plants. The domestic animals consist of horses, cattle, sheep, goats, camels, mules, and asses. Mules, camels, and asses are the

usual beasts of burden, the horses being generally reserved for war and the chase. Vast herds of oxen are met with throughout the country. The wild animals are the lion (rare), elephant, hippopotamus, rhinoceros, crocodile, buffalo, hyena, leopard, boar, antelope, zebra, quagga, giraffe, gazelle, and civet. The hippopotamus abounds in Lake Tsana, and great numbers are killed annually for their flesh and hides. The rhinoceros, like the elephant, inhabits the low, moist grounds, and is numerous in certain districts. Crocodiles are found in various rivers, but the largest and most dreaded are those that inhabit the Tacazzé. The buffalo, a comparatively harmless animal in other countries, is here extremely ferocious. Among the Quadrumana are a remarkably long-eared ape, and the species of monkey called macaque, which inhabits the lofty mountains of Southern Abyssinia. Serpents are numerous, among them being the boa, which often attains a length of 20 feet. Bees are numerous, honey being a general article of food; locusts often lay the land waste, and the saltsalya fly is destructive to cattle during the rainy season.

The foreign trade is chiefly carried on through Massowa, Berbera, Zeila, Jibutil, Obok, and other (non-Abyssinian) ports on the Red Sea; but the external traffic has never been of great importance. The nature of the country is adverse to an extensive trade, and there are comparatively few commodities suited for export. The exports are chiefly coffee, civet, honey, wax, gum, hides, ostrich feathers, ivory, and rhinoceros horns; the imports, pepper, antimony, bottles, needles, silks, turkey-red cloths, tobacco, cotton, fire-arms, &c. Manufactures are unimportant. The Abyssinians are said to excel in tanning, and they make parchment from sheep and goat skins. They also make coarse woollen stuffs, arms and small iron implements, horn drinking vessels, coarse black pottery, and some other articles.

Ethnographically Abyssinia is a land of confusion. The aboriginal elements of the population are best represented by the Agao, who inhabit Agaomedir, to the south and west of Lake Dembea, and also Lasta, around the river Tacazzé. They belong to the eastern or Ethiopian section of the Hamitic branch of the Caucasian stock, and some Egyptologists are of opinion that they are descended from a Nubian tribe which was driven southwards in early times. Closely related to the Agao are certain other tribes still represented in various parts of the country. Among these are the Falashas, who profess a somewhat ancient form of Judaism, and occur in many parts of the plateau, and even farther south. They hold themselves apart, as a rule, from the rest of the population. Unlike most Jews they have an aversion to commerce, and are mainly occupied in agriculture and some of the industrial arts. The Kamants of Gondar and other parts resemble the Falashas in many ways, speaking the same language and having similar religious observances; the Bogos or Bilen of the north are a small allied group of some interest; and among other more or less primitive Hamitic tribes are the Lakue, Dambelas, Habab, and the Vaitos. For long, however, these Hamite peoples have been under the domination of Himyaritic Semites from Yemen in Arabia. These Semitic peoples have mingled with the Hamites whom they subdued, and also with various Arab and Negro peoples, and owing to the fact that this commingling has been less pronounced in some portions of the country than in others, several well-marked Himyaritic groups can be distinguished. To the north and east are the Tigré, whose territory is roughly bounded on the south by the Tacazzé river; and to the south and west are the Amharas. The Shoas of the south-east differ but little from the Amharas. Of these the Tigré best represent the original Himyaritic invaders, and their language (Tigrinya) is nearer to the original language, known as Geez, which is still used in religious ceremonies. (See ETHIOPIA.) The Amhara, however, are the preponderant section, and their language (Amharinya), besides being the literary language, is used in commerce and diplomacy. In the more southerly parts of the country there are various Hamitic tribes known as Gallas, and to the west and south-west of Lake Dembea there are the negro Shankallas. The Danakil along the Red Sea coast, the Shoho south-west of Massowa, and other groups are Mohammedan Arabs. The Ethiopians are characterized by good proportions. They are of medium height, with broad shoulders, a high forehead, a straight or sometimes aquiline nose, thick lips, a pointed chin, and a rather more protruding mouth than in Europeans. The hair is usually somewhat curly, and in colour they vary from black to a very light brown. Some of them show negro characters. The national religion is a form of Christianity originally introduced from Alexandria in the fourth century. One of its characteristic tenets is the monophysite doctrine that denies the human nature of Christ. The head of their church is a priest called the *Abuna*, who has for long been a foreigner. He is consecrated by the patriarch of Alexandria and has great power, but his influence is practically curtailed by the all but equal power of the national head of the church, or *Echaghey*. The latter is also the head of the learned laymen called *dabtara*, who discharge many ecclesiastical functions. Much of the land of the country belongs to the priests and the monks of the various orders, and education is entirely in the hands of the church.

The Abyssinians are profligate and sensual, and given to many vices, but they are not without some redeeming traits, of which charity to the poor and hospitality to the stranger are the most conspicuous. In nearly all the provinces and districts marriages are performed with great simplicity, and are as easily dissolved. There is an old code of laws called the King's Guide, which is ascribed to the emperor Constantine. It gives to the father the power of life and death over his children, and to the king the same power over his subjects. Blinding and death are the penalties for a son's revolt against his father, or a subject's rebellion against the king. Blasphemy and lying are punished by the loss of the tongue, thieving by that of the right hand. A murderer is handed over to the family of his victim to meet death in the same way as that victim, but if the murder was unintentional a money price only is exacted. Smoking is prohibited. There are no lawyers, and it is said that a child is often chosen to pronounce judgment. Domestic negro slavery exists, but not in an aggravated form.

The Abyssinians were converted to Christianity, in the time of the emperor Constantine, by some missionaries sent from Alexandria. In the sixth century the power of the sovereigns of their kingdom had attained its height; but before another had expired the Arabs had invaded the country, and obtained a footing in Adel, though they were unable to extend their conquests farther. For several centuries subsequently the kingdom continued in a distracted state, being now torn by internal commotions and now invaded by external enemies (Mohammedans and Gallas). To protect himself from the last the Emperor of Abyssinia applied, about the middle of the sixteenth century, to the King of Portugal for assistance, promising, at the same time, implicit submission to the pope. The solicited aid

was sent, and the empire saved. The Roman Catholic priests having now ingratiated themselves with the emperor and his family, endeavoured to induce them to renounce the tenets and rites of the Coptic Church, and to adopt those of Rome. This attempt, however, was resisted by the ecclesiastics and the people, and finally ended, after a long struggle, in the expulsion of the Roman Catholic priests about 1630. The kingdom, however, gradually fell into a state of anarchy, which, about the middle of the eighteenth century, was complete. The king, or negus as he was called, received no obedience from the provincial governors, who, besides, were at feud with one another, and severally assumed the royal title. Abyssinia thus became divided into a number of petty independent states. A remarkable, but, as it proved, quite futile attempt to resuscitate the unity and power of the ancient kingdom was commenced about the middle of the nineteenth century by King Theodore, who aimed at the restoration of the ancient Kingdom of Ethiopia, with himself for its sovereign. He introduced European artisans, and went to work wisely in many ways, but his cruelty and tyranny counteracted his politic measures. In consequence of a slight, real or fancied, which he had received at the hands of the British government, he threw consul Cameron and a number of other British subjects into prison in 1863, and refused to give them up. To effect their release an army of nearly 12,000 men, under the command of Sir Robert Napier, was despatched from Bombay in 1867. The force landed at Zoulla on the Red Sea in November, and marching up the country came within sight of Magdala, the capital of Theodore, in the beginning of April, 1868. After being defeated in a battle Theodore delivered up the captives and shut himself up in Magdala, which was taken by storm on the 13th April. Theodore was found among the slain, the general opinion being that he had fallen by his own hand. After the withdrawal of the English fighting immediately began among the chiefs of the different provinces, the three most powerful, Kasa, Gobasie, and Menelek, struggling for the supremacy. This state of matters continued for some time, but at last the country was divided between Kasa, who secured the northern and larger portion, and assumed the name of Johannes, and Menelek, who gained possession of Shoa. Latterly Johannes made himself supreme ruler, with the title of emperor, or king of kings (Negus Negusti). Taking advantage of the troubles in Abyssinia the Egyptians annexed Massowa and adjoining territory on the Red Sea; and hostilities were repeatedly carried on between them and Johannes. In 1885 the Egyptian forces were withdrawn, and Italy, with the consent of Britain, declared a protectorate over Massowa and the strip of territory along the coast of the Red Sea. In the following year the Italians pushed inwards to Saati, a few miles west of Massowa, an action which led to war with the emperor Johannes. An Abyssinian force was sent in 1887 to recover Saati, but though a small Italian force was cut to pieces at Dogali, the Italians maintained their position. On the death of the emperor Johannes in 1889 while fighting against the Mahdists, Menelek, who had concluded an alliance with Italy, raised himself to the imperial throne. The result of this was the strengthening of the Italian hold on the country. The Italians regarded their treaty with Menelek as giving them a protectorate over Abyssinia, and by 1892 the whole of Ethiopia was generally recognized as within the Italian sphere. Proceeding to extend and strengthen their position the Italians in 1889 occupied Keren, capital of the Bogos country, situated some 60 miles west of Massowa, and also fortified Asmara, to the south-west of Massowa. Adua, the capital of Tigré, and the centre of opposition to Menelek, was occupied in the following year. The Mahdists were also defeated, and Kassala in the Soudan was occupied by the Italians. Menelek, however, latterly repudiated the Italian protectorate, broke with his former allies, and in 1896 his troops inflicted on them such a defeat as gave a death-blow to their claim of a protectorate over all Abyssinia. The treaty concluded in that year between Menelek and the Italians practically abrogated the treaty of seven years before, but left Italy in possession of a strip along the Red Sea coast from the French colony of Obok on the south to Ras Kasar on the north, known officially as Eritrea (Erythræa). Latterly the French have been pushing their connections inland from Obok, and by permission of Menelek have constructed a railway, which, starting from their seaport Jibuti, runs into southern Abyssinia towards Harrar. The relations between Britain and the emperor have been very friendly of late years; boundary questions have been arranged (1907), as also commercial relations, and Menelek recently gave assistance against the Somalis and their 'mad Mullah'. Pop. 5,000,000 to 8,000,000.

ACACIA, a genus of plants belonging to the natural order Leguminosæ, and the sub-order Mimoseæ. The members of this genus are trees or shrubs with compound pinnate leaves and small leaflets. In certain species these leaflets are wholly or partially undeveloped, and in these cases the petiole or leaf-stalk expands into the form of a blade resembling a leaf, and hence called *phyllodium*. These flattened leaf-stalks have the transverse section of their blade in a vertical direction, and in the forests of Australia, where these acacias are common, the light effects resulting from this arrangement are often very remarkable. Many species have their stalks protected by strong spines, whence the name acacia, from the Greek *akē*, a point. The flowers, usually small, are arranged in spikes or heads at the axils of the leaves near the extremity of the branches. The corolla is bell or funnel shaped, and is often of a yellow or red colour, sometimes even greenish; the stamens are long and numerous; the fruit is a dry pod opening by two valves, and containing several elongated seeds. Several of the species yield gum-arabic, gum Senegal, and other gums; some have astringent barks and pods, used in tanning; and in the gum of an Australian species the natives of the Swan River find an important article of food. *A. Seyal* is probably the plant that yielded the shittim-wood of the Bible, and *A. formosa* furnishes the Cuba timber called Sabicu. The *Acacia Catechu*, which yields the valuable astringent called catechu, is a native of the mountainous parts of India, and is a small tree growing to the height of about 12 feet. The *Acacia dealbata* is the wattle-tree of Australia, and is the most beautiful and most useful of all the many species found on that island. It forms shady and fragrant groves near the banks of streams and lakes. Its height is from 15 to 30 feet. Its bark contains a large percentage of tannin, and is hence a considerable article of export. When the acacia groves are in full blossom they send forth a fragrance that may be perceived at the distance of several miles.

ACADEMY, an association for the promotion of literature, science, or art, established sometimes by government, sometimes by the voluntary union of private individuals. The members, who are usually divided into ordinary, honorary, and corresponding members, either select their own departments, or follow those prescribed by the regulations, and at periodical meetings communicate the results of their labours in papers, of which the more important are afterwards printed. The name Academy was first

applied to the philosophical school of Plato, from the place where he used to teach, a grove or garden at Athens which was said to have belonged originally to the hero Academus. (See PLATO.) The first institution of antiquity which merits the name of Academy, in the modern sense of the term, was at Alexandria, where the generosity of the Ptolemies collected many scholars, who were to have laboured for the extension and perfection of human knowledge, but soon fell into idleness, or the exercise of grammatical subtleties. Academies may also be said to have existed among the Arabs, whose excellent caliphs, Almansor, Harun al Rashid, and Almamun, founded a number of such institutions from Cordova to Bokhara. After the conquest of Constantinople by the Turks, when Greek scholars were compelled to flee to Italy, Lorenzo de Medici founded at Florence the first Italian academy. Academies devote themselves either to the cultivation of science generally or to the promotion of a particular branch of study, as medicine, antiquities, language, and the fine arts. The most celebrated institutions bearing the name of academies, and designed for the encouragement of language, antiquities, and science respectively, are the French Académie Française (founded by Richelieu in 1635), Académie des Inscriptions (founded by Colbert in 1663), and Académie des Sciences (founded by Colbert in 1666), all of which are now merged in the National Institute. The first has always been the most famous. (See INSTITUTE OF FRANCE.) The oldest of the academies instituted for the improvement of language, and one of the oldest of all modern academies, is the Italian Accademia della Crusca (now the Florentine Academy), formed in 1582, and chiefly celebrated for the compilation of an excellent dictionary of the Italian language, and for the publication of several carefully prepared editions of ancient Italian Poets. In Great Britain the name of academy, in the more dignified sense of the term, is confined almost exclusively to certain institutions for the promotion of the fine arts, such as the Royal Academy and the Royal Scottish Academy. Other organizations of the kind that would be called academies on the Continent are here called simply societies or institutions. The Royal Academy of Arts (usually called simply the Royal Academy) was founded in London in 1768, under the patronage and encouragement of George III., 'for the purpose of cultivating and improving the arts of painting, sculpture, and architecture'. The number of academicians was originally thirty-six, but was afterwards raised to forty-two, among whom are two engravers. There are also thirty associates, from whom alone the academicians are elected. Of the associates five are engravers. An associate, on being raised to the rank of academician, is required to produce, within a certain time, a painting or other work of art, which is called his 'diploma work', and becomes the property of the academy. There are in connection with it five professors, three of whom are academicians, and deliver lectures respectively on painting, sculpture, and architecture. The other two are professors of anatomy and chemistry. There is also a teacher of perspective. Any person who is possessed of sufficient proficiency may be admitted as a student and receive instruction gratis, and prizes are annually bestowed on meritorious students. The annual exhibition of the Academy is open to all artists whose works show sufficient merit. It is held in summer, being open from the first Monday in May to the first Monday in August. A winter exhibition of works of the old masters and deceased British artists is also held. The Royal Scottish Academy of Painting, Sculpture, and Architecture was founded in 1826 on the model of the Royal Academy of London. It was incorporated in 1838. It consists of thirty academicians and twenty associates. The Royal Hibernian Academy at Dublin was incorporated in 1823, and reorganized in 1861. It consists of thirty members and ten associates. In August, 1902, there was incorporated a British Academy for the Promotion of Historical, Philosophical, and Philological Studies. It consists of forty-nine fellows.

ACADIA (French *Acadie*), the name formerly given to the great peninsula of North America that now comprises the British colonies of New Brunswick and Nova Scotia. It received its first colonists from France in 1604, being then a possession of that country, but it passed to Britain, by the Peace of Utrecht, in 1713. In 1756 some 18,000 of the French inhabitants were forcibly removed from their homes on account of their hostility to the British, an incident on which is based Longfellow's poem Evangeline.

ACALEPHÆ, a term formerly used to denote the group of Hydrozoa (Cœlenterata), represented by the Medusidæ or Jelly-fishes (which see) and their allies. The name itself is derived from the Greek *akalēphē*, a nettle, and was applied to these animals in allusion to their stinging powers. In modern zoology the term Acalephæ is dropped or used differently, and the animals included under this name are now distributed in several different groups, constructed from the better understanding of the affinities and structure of the Jelly-fishes. Thus the group Acalephæ included the *Gymnophthalmate* or Naked-eyed Medusæ (now represented by the modern Discophora), and the *Steganophthalmate* Jelly-fishes (represented in the modern classification by the Lucernarida in greater part). The Ctenophora, represented by the Beröe, Venus' Girdle or *Cestum*, and their allies, were also included in the Acalephæ; but the Ctenophora have been removed altogether from the class Hydrozoa, and placed in that of the Actinozoa, of which the Sea-anemone (which see) is the type.

ACANTHACEÆ, or ACANTHADS, a natural order of monopetalous exogens, consisting of herbaceous plants or shrubs, found chiefly within the tropics, where they are very common, and often form a large part of the weedy herbage. The genus *Acanthus*, the type of the order, is a native of many parts of the south of Europe; and possesses considerable interest in the history of art, as it is said to have suggested to Callimachus the idea of the Corinthian capital. The best-known species of the genuine acanths, or brancursines, as they were formerly called, are *A. mollis* and *A. spinosus*. The former has a stem about 2 feet high, surrounded in its lower half with large, soft, shining, hairy, and deeply indented leaves, and covered from the middle to the top with large white flowers tinged with yellow. Like most plants of the order, its leaves and roots abound in mucilage. The latter species, *Acanthus spinosus*, differs from the former in having a more stunted stem, spiny and more deeply indented leaves, and flowers tinged with pink instead of yellow. Both species are perennial, are propagated by dividing the summit of the root, and have long been cultivated for ornament in the gardens of Great Britain. They are only half-hardy, and require to be protected from severe frosts.

ACANTHOPTERI and ACANTHOPTERYGII, a group of Fishes, distinguished by the fact that at least the first rays in each fin exist in the form of stiff spines. The scales are usually of the *ctenoid* or comb-like kind, and the ventral fins are beneath or in advance of the pectoral or breast fins, that is, are *jugular* in position. To the Acanthopterous division of fishes belong the Perches (Percidæ), Mullets (Mugilidæ), Mackerel (Scomberidæ), Gurnards (Trig-

lidæ), Wrasses (Labridæ), and other groups of familiar fishes.

ACANTHUS. See ACANTHACEÆ.

ACAPULCO, or LOS REYES, a seaport of Mexico, in the state of Guerrero, on the Pacific Ocean. It is indifferently built, consisting of houses which, owing to the frequency of earthquakes, are seldom more than one story high, and has a most unhealthy site. The harbour is capacious, well-sheltered, has deep water close to the shore, and is altogether the best on the west coast of America. Acapulco had formerly a considerable trade, but its commerce is now small. Its greatest prosperity was at the time when it enjoyed the traffic of the celebrated Manilla galleons. It is a coaling station for steamers trading in the Pacific, and exports some cochineal, indigo, wool, cacao, &c., importing cotton goods, ironware, &c. Pop. 5000.

ACARNANIA, the most westerly portion of ancient Greece, bounded east by Ætolia, north by Epirus, and west and south by the Ionian Sea. The Acarnanians were behind the other Greeks in civilization, being rude and barbarous even as late as the Peloponnesian war, and living by robbery and piracy. The country is mountainous and covered with forests, but contains many fertile valleys. Together with Ætolia it now forms a division of the Kingdom of Greece, with a pop. of 141,405 in 1907.

ACARUS. See MITE.

ACCELERATION, a term used in mechanics to designate the increase of velocity which a body acquires when continually acted upon by a force in the direction of its motion. A body falling from a height is one of the most common instances of acceleration. The opposite of acceleration is retardation, of which the motion of a projectile furnishes a familiar example. The causes of both were first satisfactorily explained by Galileo. See FALL OF BODIES.

ACCENT, a word used by grammarians in several different but related senses. Accent, for example, is used to signify the characteristic intonation of a speaker, a district, or a country, as, a peculiar accent, the French accent, the Yorkshire accent. This is a derivative and amplified meaning. More technically the word is used to signify three things very closely related: 1st, the rising or falling inflection of the voice in speaking; 2nd, the rhetorical emphasis given to a particular word in a clause, and which varies according to the structure or meaning of the clause; and 3rd, the habitual stress given to a particular syllable of a word with more than one syllable. Accent also signifies various marks placed on words or letters, to indicate the stress of the voice, or distinguish the pronunciation.

The invariable syllabic accent which distinguishes the pronunciation of particular words in whatever relation they may stand to others, is called tonic accent. Questions of considerable difficulty, and which have led to a good deal of difference of opinion, have risen in regard to the use of tonic accents both in ancient and modern languages.

It might seem that there could be no difficulty in determining whether a tonic accent was used in a living language or not, but the question is more complicated than at first appears; and judging from the testimony of French grammarians, it really seems undetermined whether the French has any tonic accent or not. A preliminary theoretical difficulty may first be noticed. Some grammarians maintain that a tonic accent exists necessarily in all languages, and some of those who hold this doctrine are French grammarians, but the leading argument produced in favour of it, the impossibility of an absolutely monotonous pronunciation, seems to apply rather to the necessity of accents than of tonic accents. French grammarians of one class give a series of rules somewhat complicated for the tonic accent, but according to which the accent generally follows the long syllables, and has no preponderating tendency to the close of the word; others give the rule that the accent is always on the last syllable, except in words ending in *e* mute, in which it is on the second last syllable; that is, according to French pronunciation, practically on the last; a third class assert that there is no tonic accent in French. Two explanations may be offered of this discrepancy: first, that there has been an actual transition in practice from the first to the second of the two positive modes of pronunciation, with an intervening period of uncertainty representing the negative mode; or secondly, that there is some misconception about the meaning of tonic accent. It favours this last supposition that one French grammarian gives a rule for placing the tonic accent on monosyllables: when the syllable is long it has the tonic accent, when it is short it has it not. If the common unit of French pronunciation is, as it seems to be, not the word but the phrase, the difficulty about tonic accent may be accounted for.

The chief difficulty in regard to accent arises, however, in connection with Greek prosody. In Latin we find accent closely associated with quantity, the rule given by grammarians being that the accent is upon the penultimate when that syllable is long, and when the penultimate is short upon the antepenultimate. Latin prosody, like Greek, is determined by quantity; but as accent and quantity harmonize it does not present the difficulty which occurs with Greek prosody. The Alexandrian grammarians introduced certain grammatical signs for distinguishing the Greek accents. The acute accent (ʹ) signified a rising inflection of the voice, the grave accent (ˋ) a falling inflection, the circumflex (^) a rising and a falling tone combined. The acute accent, replaced in certain circumstances by the circumflex or the grave accent, was used to indicate the syllable on which the tonic accent was to be placed. Classic Greek poetry, like Latin, was measured by quantity, that is, by the number of long and short syllables; but the tonic accent, according to the Alexandrian rules, frequently falls on a short syllable, and the difficulty is to observe the tonic accents thus indicated without violating the prosody of the verse.

It is to be observed that in modern Greek pronunciation the tonic accent has prevailed over the ancient quantities, and that modern Greek verse is measured by the new accents, not by the old quantities, while the poets of the Alexandrian age still observed the ancient rules of prosody. These facts might afford a solution of the difficulty, if it were allowed to suppose that the transition in pronunciation which has taken place between ancient and modern times had already been begun in the Alexandrian days, and that the accents represent the new pronunciation, and not the old. The retention of the old measure in Alexandrian verse would be accounted for on a principle of which there are abundant illustrations in literature as in all other human affairs. The practice of the older poets would have established a rule, which would be mechanically followed by their successors, and would be clung to with all the more veneration that, the reason for it being lost, it had become a mere superstitious observance, until time had worn out the hollow observance and established new customs.

This explanation is not at all favoured by scholars, however, and the Alexandrian tradition is held to represent the true facts of ancient pronunciation. Some scholars who hold this opinion regard the revival of the ancient pronunciation as hopeless; others are much more sanguine, and boldly maintain the practicability of the enterprise. Those who

hold the former opinion dwell on the habits of modern pronunciation, those who hold the latter upon the difference between quantity and accent. The latter argument, which is much insisted upon, requires some examination. It is perfectly true that in some languages at least, as in English, tonic accent consists not so much in the prolongation of the sound of the accented syllable as in the stress of the voice thrown on it. Perhaps force as distinguished from duration of sound might be held to be the distinctive quality of the tonic accent, although in some languages the force of the accented syllable is less marked and its duration more than in others. In Italian, for example, except on final accented vowels, which are short, the duration of the accented syllable is commonly greater than in English. The stress laid on the accent in ordinary English pronunciation is injurious to the articulation and vocalization of the unaccented syllables. But, admitting the distinctness of force and duration, we cannot go the length of those who insist on the practicability of separating them in pronunciation. This view is enforced by an appeal to the case of music. A musical accent can certainly be placed on a short note, but it requires practised proficiency to do so; besides, a musical note is a vocal, but not necessarily an articulate utterance. The more complex operation has accordingly to be performed not by experts but as a habitual matter in ordinary pronunciation. In living European languages accent always allies itself with quantity; if it chances to fall on a short syllable it tends to lengthen it, especially if there are consonants in the syllable to be articulated. Stress is not necessarily associated with quantity, but stress requires time, and a short unaccented syllable can always be pronounced with much greater rapidity than a short accented one. When a long unaccented syllable is associated with a short accented one the difficulty is increased, and the attempt to throw the accent on the short syllable generally ends in dividing the word into two.

In English accent is so inseparable from quantity that in polysyllabic words, which have commonly a secondary accent, the quantity of the syllable is affected even by the secondary accent. In the word *accommodation* there is a secondary accent upon the second syllable, both the *ac* and *com* are short, but the voice manifestly rests upon the *com*, accelerating the delivery of the unaccented *ac* to reach it, and sensibly altering the relative duration of the two syllables. In Greek, however, we are expected habitually to perform feats, such as pronouncing the word *intermediate*, with the tonic accent on the second *i*, which must be kept short, while the *e* and *a* are still made long. English verse is roughly measured by the distribution of accented and unaccented syllables, the former being equivalent to the long and the latter to the short syllables of classic verse; but in order to the production of melodious and harmonious verses the natural length and weight of syllables must be attended to.

Accent in music corresponds to accent in language, being the stress or emphasis laid upon certain notes or parts of a bar or measure. The first note of a bar has the strongest accent, but weaker accents are also given to the first notes of subordinate parts of the bars, as to the third, fifth, and seventh in a bar of eight quavers. This is called grammatical accent. Oratorical accent is the expression with which a portion of music is executed, and depends on taste and feeling.

ACCEPTANCE, in law, is the act by which a person binds himself to pay a bill of exchange drawn upon him. For the form of acceptance see BILL—Bill of Exchange. No acceptance is valid unless made in writing on the bill, but an acceptance may be either absolute or conditional, that is, stipulating some alteration in the amount or date of payment, or some condition to be fulfilled previous to payment. Conditional acceptances are rare, though it is common for the sake of accuracy for the acceptor to state the date on which he understands the bill according to its tenor to be due.

ACCESSARY, or ACCESSORY, a person guilty of an offence by connivance or participation, either before or after the act committed, as by command, advice, or concealment, &c. An accessary *before the fact* is one who procures or counsels another to commit a crime, though he is not present at its commission; an accessary *after the fact* is one who, knowing a felony to have been committed, gives assistance of any kind to the felon so as to hinder him from being apprehended, tried, or suffering punishment. To be an accessary before the fact is a greater offence than to be an accessary after; the former may be tried and punished in all respects as if he were the principal felon. In high treason, all who participate are regarded as principals. Abettors and accomplices also come, in some measure, under this name. An abettor is one who procures another to commit an offence, and in many, indeed in almost all cases, is now considered as much a principal as the actual offender. An accomplice is one of many persons equally concerned in a felony.

ACCIDENTALS, in music, notes introduced accidentally in the course of a piece of music in a different key from that in which the passage they occur is principally written. They are represented by the sign of a sharp, flat, or natural immediately before the note which is to be raised or lowered.

ACCIPITRES, a name used synonymously with Raptores (which see) to indicate the order of birds including the Eagles, Hawks, and Birds of Prey generally.

ACCIPITRINÆ, a sub-family of the order Accipitres (see above article), including the genus *Accipiter*, to which the common Sparrow-hawk (*A. nisus*) belongs, and also the genera *Astur* and *Melierax*; the former represented by the Goshawk (*Astur palumbarius*), and the other by the Chanting Falcon (*M. musicus*) of Africa, and its allies. The Accipitrinæ or Sparrow-hawks as a sub-family are distinguished by the short, arched bill, which has a sinuous or wavy outline; by the long wings and the large tail; whilst the tarsi are covered in front with large scales.

ACCLIMATIZATION may be defined as the process of accustoming plants or animals to live and propagate in a climate different from that to which they are indigenous. The word *acclimation* has been used to signify the change which an organism undergoes on being subjected to a new climate, and *acclimatation* to signify the process through which the change is produced. Acclimatization is an acclimatation so conducted as to adapt the organism permanently to its new home. These words have been found fault with on the ground that the influences to which an organism is subjected from change of locality are not wholly due to climate. But besides the influences which are wholly due to climate, there are others which are indirectly affected by it, such as food, and as climate may fairly be taken as representative of local influences, no great inaccuracy can result from using it in this sense. The word *naturalization* has been suggested instead of acclimatization, but it is more properly applied to the case of animals or plants taking readily to a new country with a climate and other circumstances similar to what they have left. European animals, such as horses and cattle, have been naturalized without difficulty in America, and the rat, rabbit, and pig, with several kinds of English birds, in various places

without any evidence of acclimatization. Similar instances occur among plants, as with thistles in New Zealand. Cultivated plants, on the other hand, are said to be acclimatized when they can be propagated without artificial protection, although they will not propagate themselves, and even if sown wild will not spread in the country to which they have been introduced.

The possibility of acclimatization has been denied by some authorities, but this seems an extreme position, and can hardly be maintained except by denying to a large extent the need of acclimatization, on the hypothesis, that is to say, that as some plants and animals are much more widely spread than others, they have had originally a wider adaptation which the others are incapable of acquiring. To the extent that climatic influences develop qualities in plants and animals which cannot be maintained without these influences, this hypothesis may be true. The general character of the plants of the tropics, for example, differs widely from that of the plants of the temperate regions, and these again differ as widely from those of the polar regions, and no amount of acclimatization would transfer the distinctive characters of the vegetation of one of these regions to any of the others. This principle implies a limit to the power of acclimatization which requires to be borne in mind and applied in cases of attempted acclimatization, otherwise much labour may be thrown away. The clothing of certain animals and the qualities of certain plants depend upon climate, and when it is attempted to transfer such animals or plants they at once begin to undergo modifications. The special qualities on which they were valued become feebler from the first, and gradually cease to distinguish them to an appreciable extent. If acclimatization is attempted for the sake of such qualities, the partial and temporary effect is all the gain that can be counted on from the mere naturalization of the foreign species. Continued attention and cultivation may, indeed, do something more toward retaining the exotic qualities, but in this case acclimatization cannot be considered as complete, and continued labour must be counted on as one of the conditions of success. If by acclimatization, however, we understand merely the successful introduction of a new race into a climate where it has not before been propagated, with such modification of qualities as conduces to the success of its propagation, there seems no reason to doubt either the possibility of the process or the benefits which may be derived from well-directed efforts to promote it. The migrations of the human race afford the first instance of successful acclimatization. If we regard the whole of mankind as one family we find that by extensive modifications they have been enabled to extend over the whole world, living in regions the most opposed in respect to climatic influences. If we do not regard mankind as a single race there are historical instances of migrations less extensive, yet sufficient to prove both climatic influence and the power of adaptation to it. The Jews, who have preserved their purity of race with scrupulous care, may be taken as an example.

If any annals had been kept of the diffusion of plants and animals, even within historical times, many illustrations would no doubt have been afforded both of the natural mode and duration of the process and of the effects of acclimatization. But the records of this kind are comparatively few. Next to man domestic animals, such as the horse, the ox, the dog, the sheep, and the various species of poultry, afford the best illustrations of adaptation. The grain which is cultivated in almost every country is indigenous to very few, and the vine, the olive, and other fruit-trees have, within historical times, been introduced into Europe from the East. In times comparatively recent the cultivation of the silk-worm has travelled from China to France.

The systematic study of acclimatization has only been entered upon in very recent times, and the little progress that has been made in it has been more in the direction of formulating anticipative, if not arbitrary hypotheses, than of actual discovery of the silent course of nature. The attention of experimenters has been directed, first, to the modifying effects of climate on individuals. The theory of Mr. Herbert Spencer is that every organ and function of a living animal undergoes modification under new conditions, generally in the direction of adaptation to those conditions. But the observed modifying effects of climate on individuals in the direction of acclimatization are so slight that it is on this ground some observers have denied the existence of any such thing at all. If, however, there is any truth in the observations on which the possibility of acclimatization rest, there must be such effects, however slight. If the first individuals submitted to the effects of a hostile climate sustained no modification adapting them to it, it cannot be supposed that such an effect would be produced in the mere act of generation, and consequently the second race would be no better adapted to stand the climate, and would have no more tendency to receive adaptive modifications than the first. Plants, which are commonly much more limited in their natural range than the higher animals, are also in some respects more amenable to acclimatization. By means of propagation by cuttings, &c., the life of the individual can be indefinitely prolonged, and Mr. Darwin believes that indications of adaptation to climate can be established in the case of plants propagated in this way. In regions where the same species of plants or animals are widely diffused, varieties, often seemingly arbitrary, are found to distinguish particular localities, and though the nature of the variation may seem to have no connection with soil or climate, each variety is usually found best adapted to its own situation. The existence of a power of adaptation would seem by such facts to be established, but whether as generally as is assumed by Mr. Spencer is altogether another question.

Assuming a positive modifying influence of climate and the accompanying circumstances of change of situation, there is an indirect way in which, when acclimatization is attempted on a large scale, climatic influences co-operate to promote it, namely, by killing off the individuals, whether of the original stock or the succeeding generations, least adapted by constitution to undergo the necessary adaptation. This is the principle of natural selection. The natural process of adaptation is, however, so slow and uncertain—that is to say, when it is applied arbitrarily, when the place from which the organisms to be acclimatized are to come and the place where they are to go are selected by human agents for their own ends—that various means have been tried to facilitate the process. The object of these means is, of course, to utilize all the agents which nature employs to the full extent of their capability, instead of leaving their utilization or non-utilization to the control of fortuitous circumstances.

The two most important means hitherto employed for facilitating acclimatization are the selection of favourable varieties and the interposition of intermediate acclimatization.

The selection of varieties is the means by which breeding or propagating is made subservient to acclimatization. The theory upon which the selection rests is that the offspring of two parents bear a general resemblance

to their parents, with certain specific or individual differences, which differences, in their turn, as well as the general resemblance, are capable of being transmitted by generation. The breeder or propagator has no control over the differences thus naturally produced in generation. They may or may not be in the direction he wishes. But out of a given number of individual varieties which have a natural tendency to diverge in all directions some will be more suitable for a specific purpose than others, or even than the parent which is held to occupy the central position. By selecting, then, the most favourable varieties for breeding, a succeeding race will be got having the desired qualities in a higher measure than their ancestors, and these again, it is said, will form the centre of a new series, some of which will extend still further in the direction of the qualities it is desired to cultivate, and which may thus be further improved by each successive selection. Some naturalists hold the possibilities of the extension of breeding in this way in a given direction, that is, of the development in a successive series of organisms of particular qualities or organs in preference to others, to be indefinitely great, or even absolutely unlimited; others hold them to be strictly limited by species. We are not at present concerned with this question. The numerous varieties which many species of plants and animals present are sufficient in any view to afford considerable scope for adaptation to climate, to which accordingly they may be made by judicious selection to contribute. On the other hand, it is well known that when breeding for special purposes is too much forced it develops a strong tendency to relapse. For further particulars on this subject see BREEDING.

The other means of acclimatization, that of acclimatization through one or more intermediate stages, was strongly recommended by Mr. Darwin, but has yet been very little resorted to, although there are instances known of its having produced very favourable results. There can be little doubt that in the natural migrations of plants and animals this process must have been used to a far greater extent than it ever will be in artificial acclimatization, and to this probably may in part be attributed the greater results achieved by unassisted nature.

ACCOLADE (French, literally an embrace, from Latin *ad*, to, and *collum*, the neck) signifies an ancient ceremony used in conferring knighthood. Antiquaries are not agreed wherein the accolade originally consisted. Some think it was the embrace or kiss given by the person who conferred the honour of knighthood. Others think that it consisted in the imitation of a blow on the neck, or on the cheek, signifying that this should be the last blow which the new-made knight should endure. The ceremony of striking the candidate with the naked sword, which afterwards took the place of the blow with the hand, had the same meaning. The Roman master also gave a blow to his slave at the time of his emancipation; and some consider this as the origin of the accolade. The British sovereign still lays a sword on the shoulder of a person when formally conferring upon him the honour of knighthood.

ACCOMPANIMENT, in music, is that part of music which serves for the support of the principal melody (solo or obligato part). This can be executed either by many instruments, by a few, or even by a single one. We have, therefore, pieces of music with an accompaniment for several, or only for a single instrument. The principles on which the effect of the accompaniment rests are so little settled that its composition is perhaps more difficult than even that of the melody or principal part. Frequently the same musical thought, according to the character of the accompaniment, produces a good or bad effect, without our being able to give a satisfactory reason for the difference. The accompaniment requires of the performer the most scrupulous study, and of the composer the greatest skill and delicacy. As the object of every musical accompaniment is to give effect to the principal part, the accompanist should always aim really to support and by no means to overpower it.

ACCORDION, a musical instrument, somewhat in the form of a small box, generally from 8 to 12 inches long and 4 inches wide, and containing a number of metallic reeds fixed at one of their extremities, but left to vibrate freely. A small bellows, formed by a folding apparatus which unites the top and bottom of the box, supplies the wind, which, admitted by means of keys acting on valves, sets the reeds in vibration, and produces pleasing notes both of melody and harmony. The English concertina is a superior instrument constructed on similar lines, and in the harmonium and American organ the same principle is also employed. The accordion is supposed to be of German origin, but the principle has long been known in China, and employed in the production of instruments played by the breath.

ACCRAH, or ACCRA, a British seaport in West Africa, capital of the colony of the Gold Coast, about 75 miles east of Cape Coast Castle. It occupies a low swampy tract, and contains a few good English houses, with a great number of wretched native huts. Near it is the fort and settlement of Christiansborg (formerly Danish), where the governor now resides. Many of the inhabitants are employed in searching for gold and manufacturing it into trinkets. The chief exports are gold-dust, ivory, gums, and palm-oil; the imports cotton goods, earthenware, cutlery, firearms, gunpowder, spirits, and tobacco. Pop. 20,000.

ACCRINGTON, a manufacturing town and municipal borough of England, in Lancashire, on the Hyndburn, 5 miles east of Blackburn. It is well laid out, and has various handsome buildings, including the town-hall, a splendid market hall, technical school and school of art, clubs, &c. The manufacture and printing of cottons, and the manufacture of spinning and other machinery, are chief industries. Coal is wrought extensively. Pop. in 1881, 31,435; in 1901, 43,095. Accrington gives name to a parl. division of the county; pop. 84,878.

ACCUSATION, in law, the formal charging of any person with a crime. It is a principle of common law that an accusation must be brought within a reasonable time.

ACCUSATIVE CASE, in Latin, and thence applied to the corresponding case in Greek and other declensions, that case of the noun, pronoun, &c., which designates the object to which the action of a verb is immediately directed. It corresponds with what, although the English noun is nearly without declension, is called in English the objective case. The formation of the case by declension is exemplified in the English pronominal forms *me*, *him*, &c.

ACEPHALA ('headless animals', from Greek *a*, not, and *kephalē*, head), a name sometimes given to one of two great divisions of molluscous animals, which are distinguished into encephala and acephala, according as they have or want a distinct head. The acephala are more generally called *Lamellibranchiata*, and are commonly known as *bivalves*.

ACERRA, a town in South Italy, in the province of Caserta, 9 miles north-east of Naples, with which it is connected by railway. It is the see of a bishop, and has a cathedral. Its situation is unhealthy, but the country around is fertile. Pop. (1901), 16,433.

ACETAL ($C_6H_{14}O_2$), a colourless liquid of agreeable taste and odour. It is readily soluble in alcohol

and ether, and to some extent also in water. It was first obtained in 1833 by Döbereiner, as one of the products of the action of air upon alcohol vapour in presence of platinum black. It has been since prepared by other oxidation methods from alcohol, and likewise synthetically from aldehyde (which see).

ACETATES, salts of acetic acid. Acetate of potassium is found in the juices of certain plants, but most of the acetates, of which the number is very large, are formed artificially. The normal compounds are soluble in water (several also in alcohol), but the basic acetates (such as verdigris) are in general sparingly soluble. When the metallic acetates are heated to redness they decompose, the products varying with the class of acetates; the metal is left as oxide or carbonate, but sometimes the reduction to the metallic state is complete. They are also decomposed by strong mineral acids. The acetates of commercial or manufacturing importance are those of aluminium and iron, which are used in calico-printing; of copper, which as verdigris is used as a colour; and of lead, best known as sugar of lead. The acetates of potassium, sodium, and ammonium, of iron, zinc, and lead, and the acetate of morphia, are employed in medicine.

ACETIC ACID ($C_2H_4O_2$), an acid produced by the oxidation of common alcohol, and of many other organic substances. Dilute acetic acid, or vinegar, is prepared on the large scale by subjecting wine to the action of atmospheric oxygen; the wine is caused to trickle downwards in a thin stream through a large oaken tube filled with beech chips, a current of air being forced upwards through the chips. Vinegar is also prepared from malt which has undergone vinous fermentation, by placing the malt in barrels covered with loose cloth, and maintained at a somewhat high temperature for a considerable time. Wood vinegar is prepared from the lighter parts of the crude distillate obtained by heating wood in closed vessels. This distillate is neutralized with lime; the crude acetate of lime so obtained is partially purified, and is then distilled along with hydrochloric acid, whereby it is decomposed, calcium chloride remaining in the retort and dilute acetic acid passing over. When quite free from water, as obtained by decomposing an acetate with the exact amount of sulphuric acid, it forms, at the ordinary temperature, transparent crystals, and the acid is then called *glacial*. This acid has a specific gravity of 1·0635. By increase of temperature it melts and finally boils, emitting a vapour which is inflammable. It has a very sour taste and pungent smell, causticizes the skin, and is poisonous. It mixes with water in all proportions, and the mixture retains the taste and smell of the absolute acid. The mixtures are characterized by anomalies in their specific gravities, which prevent the specific gravity being employed as a ready means of ascertaining the amount of real acid present in an aqueous solution. Acetic acid is monobasic, forming salts having the general formula $C_2H_3MO_2$, where M represents a monovalent metal.

Acetic acid is largely consumed in the arts, in medicine, and for domestic purposes, being used as a solvent for metals and their compounds, for gums, essential oils, &c., as an antidote for certain poisons, and so on. In calico-printing the crude pyroligneous acid is preferred in certain cases to the pure acetic acid.

What is usually sold as vinegar contains on an average 4 per cent. of the absolute acid, but it is often mixed with colouring-matter, spices, and other foreign materials.

ACETIC ETHERS. Acetic acid (which see) is what is termed a monobasic acid—that is to say, but one series of salts is derived from this acid. In the formula for acetic acid ($C_2H_4O_2$) one hydrogen atom only is replaceable by metals. If this hydrogen be replaced by alcoholic radicles—that is, by those groups of atoms (always containing carbon) which enter into the composition of the alcohols, acetic ethers are produced; and these ethers are distinguished from one another by names derived from the name of the alcohol, the characteristic radicle of which has replaced the hydrogen in acetic acid. Thus, when ordinary or ethylic alcohol is treated with acetic acid, an ether is formed containing the group ethyl, and to this substance the name of 'ethylic-acetic ether' is given, $\left.\begin{matrix}C_2H_2O\\C_2H_5\end{matrix}\right\}O$. By substituting amylic for ordinary alcohol 'amylic-acetic ether' is produced, and so on. The general formula for these ethers is $\left.\begin{matrix}C_2H_3O\\M\end{matrix}\right\}O$, where M represents a monovalent alcoholic radicle. The best known member of this class of ethers is ethylic-acetic ether, or, as it is commonly called, acetic ether. This substance, which has been known since the latter part of the eighteenth century, is a volatile liquid somewhat lighter than water; it is possessed of a pleasant odour, and is inflammable, burning with a yellow-coloured flame.

ACETYLENE. See SUPPLEMENT.

ACHÆANS, ACHAIA. The Achæans were one of the four races into which the ancient Greeks were divided. According to the commoner opinion they were Hellenes. The legend connected with this view is, that they derived their name from Achæus, a son of Xuthus and Creusa, and grandson of Hellen. Another account accepted by Thirlwall makes the Achæans of Pelasgic origin. In the heroic age they were found in a district of the south of Thessaly, in which Phthia and Hellas were situated, and to which they gave their name. They were also the dominant race in the Peloponnesus, of which they occupied the eastern part, particularly Argos and Sparta. It is not known whether the Phthiotan or the Peloponnesian Achæans were the earlier. There are legends favouring both views, but the prevailing opinion is in favour of the precedence of the former. About eighty years after the Trojan war the Peloponnesian Achæans, according to tradition, were subdued or driven out by the Dorians. Of those who did not submit to the conquerors the greater number, it is said, went under the leadership of Tisamenus, son of Orestes, to the district in the north of the Peloponnesus then called Ægialus or Ægialia (The Coast), drove out the Ionians, who occupied it, and gave it their own name. It is, however, doubted by some whether the Achaia of the historic period ever was occupied by the Ionians, and they suppose the district of Achaia to be the seat of the remainder of the Peloponnesian Achæans, who had not submitted to the Dorians. The district of Achaia is a comparatively narrow belt of coast which terminates the Peloponnesus in the north. It was separated on the south from Arcadia and Elis by the hills of the northern Arcadian range, and was only accessible on this side through the deep gorges traversing the hills. It extended on the north along the Gulf of Corinth from the river Larissus to the Sythas, which divided it from Sicyonia, having a length along the coast of about 65 miles. From the Arcadian chain numerous ridges run down to the sea. The distance is so small that the rivers are short, but the country is watered by numerous torrents. The largest rivers are the Pirus and Crathis. The coast is low, and the harbours indifferent. The soil of the country is made to a great extent by the rivers, each of which, according to its size, has formed a promontory of its own. The coast and valleys are fertile, but the whole of the western part from Patræ is at

present covered with forest or pasture. Behind Patræ is situated the Mons Panachaicus, 6322 feet high, the highest mountain in the country. The principal promontories are Drepanum, the most northerly point of the Peloponnesus, Rhium, and Araxus.

The original inhabitants of Achaia are said to have been Pelasgians, followed by the Ionians, who were driven out by the Achæans. The Achæans are said to have been governed by the descendants of Tisamenus down to Ogygus, after whose death they formed a democracy. They had twelve principal cities, which formed each an independent republic, while they united together in a loose federal league. The number of independent cities is supposed to have been greater than twelve; but for some reason or other the number of the league seems to have been fixed at twelve. The names of the cities in the time of Herodotus were Pellene, Ægeira, Ægæ, Bura, Helice, Ægium, Rhypes, Patreis, Pharæ, Olenus, Dyme, Tritæeis. Leontium and Ceryneia were afterwards substituted for Rhypes and Ægæ. The bond of union between these cities was social and religious rather than political. They met at religious festivals and adjusted their differences, but more than one of the cities is found, whether in defiance of the union or in the exercise of its liberty, entering into political combinations independently of the others. The place of meeting was first Helice (swallowed by the sea B.C. 373), and afterwards Ægium. The Achæans mingled very little in the leagues and wars of Greece. They did not even assist the other Greeks against the Persians. They appear, however, to have been generally respected for their integrity and good faith, and to have enjoyed peace and prosperity till the time of Philip of Macedon. The Athenians formed an alliance with them in B.C. 454, but found it necessary to renounce it on their agreement with Sparta in 445. The Achæans fought with the Athenians and Bœotians against Philip at Chæroneia B.C. 338, and eight years afterwards they suffered severely at the battle of Mantineia. After the death of Alexander the Macedonian rulers put garrisons in the Achæan cities, which after the death of Lysimachus (B.C. 281) began again to assert their independence. Patræ, Dyme, Tritæeis, and Pharæ, having expelled the Macedonians, renewed the ancient league (B.C. 280). They were joined in 275 by Ægium and Bura, and finally ten cities, all that remained of the old confederates, joined the new league. The bond of union was now strictly political. No city could make peace or war for itself, the league had a general (Stratēgus) and other officials, and a federal assembly which met twice yearly, the voting being by cities, and the business submitted by a council. In B.C. 251 Aratus, having overthrown the tyrant of Sicyon, cast in his lot with the Achæan league, of which he became henceforth the leader. Hitherto the league had been entirely confined to the cities of Achaia, but his policy was to extend it and use it as an instrument for the deliverance of Greece from the Macedonian power. Accordingly city after city in the Peloponnesus was incited and aided to cast off the yoke of the tyrants who depended on Macedon and join the league. Corinth was gained in B.C. 243; Megara, Troezen, and Epidaurus followed in the same year, Megapolis joined a few years later, Argos in B.C. 236. Thus the power of Achaia began again, as in the days of Agamemnon, to extend over the Peloponnesus; but the rising power provoked the hostility of Sparta, certain towns claimed by her having been admitted into the league, and Aratus, defeated by Cleomenes, king of Sparta, undid his work by throwing himself into the arms of Macedon. Antigonus Doson, king of Macedonia, defeated Cleomenes in B.C. 221, and effectually humbled Sparta, but the league henceforth was under the ascendency of Macedon, and its influence declined till it was revived by Philopœmen, who disciplined the troops of the cities and taught them to trust to their own arms. He defeated Machanidas the Spartan tyrant in B.C. 208, but with questionable foresight he supported the Romans in the war with Philip of Macedon. After the overthrow of Macedon the Achæan league was the only power which could make a stand for the liberty of Greece. It continually received fresh accessions to its strength, and when it was joined by Sparta in B.C. 192, Messenia and Elis in B.C. 191, the whole of the Peloponnesus belonged to it. But the league was already divided; a Roman party prevailed in its councils, and it was almost governed by the senate. After the defeat of Perseus, Callicrates, who headed the Roman party, drew up a list of 1000 of his opponents, who were taken to Rome B.C. 167. After a lapse of seventeen years the remainder, about 300, were allowed to return, and many of them laboured to excite the natural spirit of their countrymen. A dispute between Sparta and the other cities of the league formed the occasion of an outbreak. The Romans ordered Sparta, Argos, Corinth, and other cities to separate from the league. Universal indignation was excited, and war became inevitable. Critolaus and Diæus, the Achæan generals, were successively defeated by Metellus and by Mummius, the Roman generals; Corinth was plundered and committed to the flames (B.C. 146); and Southern Greece, under the name of Achaia, became a Roman province. Achaia now forms one of the nomarchies of the Kingdom of Greece, with a population, according to the census of 1907, of 150,918.

ACHARD, Franz Karl, German physicist and chemist, born at Berlin, April 28, 1753, is principally known by his invention (1786–1800) of a process for manufacturing sugar from beet-root, which since that time has been brought to much greater perfection. He was director of the department of physics in the Royal Academy of Sciences at Berlin. To enable him to initiate his manufacture, the great importance of which was acknowledged, the King of Prussia provided him with funds with which he acquired the estate of Kunern in Silesia, where the first manufactory of beet-root sugar was established. It began operations in 1802, was afterwards destroyed in the wars of the time, but was again started, and served as an institution for the purpose of teaching his mode of manufacture, which attracted much attention. He died at Kunern, April 20, 1821. Besides treatises on physics and agriculture, he published works on the manufacture of sugar from beet.

ACHATES, a companion of Æneas, celebrated by Virgil. He is always distinguished in the Æneid by the epithet *fidus*, 'faithful'.

ACHEEN, or Atchin (properly *Acheh*), a native state or territory in Sumatra, the capital and nucleus of which, bearing the same name, is situated near the north-western extremity of the island. The houses are of timber and thatch, and are arranged in groups called kampongs, interspersed with numerous fruit-trees. The town stands on a low plain, fertile and highly cultivated, 2 or 3 miles from the sea, chiefly on the left bank of a river, which has a bar at its mouth, so that the harbour only admits small vessels. The town is now in the hands of the Dutch, but they have to keep a strong garrison here. They have made a railway between it and the port. When Acheen was visited by Alvaro Tellez, a captain of Tristan d'Acunha's fleet in 1506, it was a small state dependent on the neighbouring state of Pedir. Twenty years later it had acquired independence, and subdued all the north of Sumatra. It

attained its acme under Sultan Iskandar Muda (1607–36), when it possessed about a third part of Sumatra, and also held the island of Pulo Nias, besides possessions on the Malay Peninsula. Its recent limits do not extend beyond 2° 48′ N. on the west coast, and Cape Tamiang on the east. From its origin the state was engaged in constant hostilities with the Portuguese in Malacca, which were often pursued aggressively. Iskandar Muda in 1615 made an expedition against Malacca with a fleet of 500 sail and 60,000 men. From 1641 till 1699 a succession of female rulers held sway in Acheen, being favoured by the Malay chiefs, who enjoyed more independence under them. A Dutch expedition was made to Acheen in 1599, an English one in 1602, and a French in 1621. No permanent settlements were effected, but a considerable number of foreign merchants took up their residence at Acheen, and an active trade was carried on both with Europe and China. One of the chief inducements to it was gold, of which there was then a considerable supply. The Dutch in Sumatra were from various causes unable till recently to attempt anything against Acheen, but the last impediment, an agreement with the British government not to extend their territory by conquest, having been removed in 1871, war was begun in 1873. Hostilities were henceforth carried on more or less continuously, but, after an immense expenditure of money and the sacrifice of many lives, the country was hardly subdued till the end of the nineteenth century. The principal exports at present are camphor, pepper, betel-nut, sappan-wood, gutta-percha, &c. The area of Acheen has been estimated at 19,000 square miles, the population at 200,000 to 400,000.

ACHELŌUS (now called *Aspropotamo*), the largest river of Greece, has its source on Mount Pindus, flows through the district where were probably the first settlements of the Grecians around Dodona, and after separating Ætolia from Acarnania, falls into the Ionian Sea. Achelōus was the chief river-god of Greece. Hesiod represents him as (with 3000 brother rivers) the son of Oceanus and Thetis, others give him a different genealogy. He was worshipped as the ruler of all fresh waters in Greece. He wrestled with Heracles (Hercules) for Dejanira, and when thrown to the ground assumed the shape of a terrible serpent, then that of an ox, and after Heracles had broken off one of his horns he fled ashamed to his waters. From the broken horn, according to Ovid, the nymphs made the Horn of Plenty. This legend is said by Strabo, who explains its various circumstances, to refer to the efforts made to restrain the overflow of the river by embankments. Virgil represents the sirens as the daughters of Achelōus. The contest of Achelōus with Heracles is often represented in Greek art.

ACHENE, ACHENIUM, a botanical term applied to a dry one-seeded fruit, the pericarp of which is closely applied to but separable from the seed. It is either solitary, forming a single seed, or aggregate, with several achenia placed on a common elevated receptacle, as in the buttercup.

ACHERON, the ancient name of several rivers in Greece and Italy, all of which were connected by legend with the lower world. The principal was a river of Thesprotia in Epirus, which passes through Lake Acherusia, receives the Cocytus (Vuvó), and flows into the Ionian Sea south of the promontory of Cheimerium, at Glycys Limen or Elæa, now Port Fanari. At one part the course of this river lies between mountains rising precipitously to the height of 3000 feet. The name is also given to a river of Elis, a tributary of the Alpheius, and to a small river of Bruttium in Italy, near Pandosia (a town of which the identification is uncertain), near which Alexander, king of Epirus, fell in battle against the Lucanians and Bruttians (B.C. 326). The legendary celebrity of these rivers appears to have been originally due to the Acheron in Thesprotia. This country being regarded by the Greeks as the end of the world in the west, they supposed the entrance to the lower world to be here. As this country became better known the legendary river was placed elsewhere, and finally transferred to the lower regions. In Homer Acheron is represented as a river of Hades. According to later traditions a son of Helios and Gæa or Demeter, who bore this name, was changed into an infernal river as a punishment for giving drink to the Titans during their war with Zeus. The Etruscans are said to have worshipped Acheron. The name of Acheron was ultimately used in a poetic or figurative way to designate the whole of the lower world.

ACHERONTIA ATROPOS. See DEATH'S-HEAD MOTH.

ACHIEVEMENT, in heraldry, a term which may be applied to the shield of armorial bearings generally, as the heraldic symbols on it were originally the marks of some great achievement of the bearer. It is, however, generally, and in the common form of *hatchment*, applied to the shield which is affixed to the house of persons lately deceased, to denote their death, rank, and station.

ACHILLES, one of the heroes of Greek mythology, and in particular the hero of Homer's Iliad. According to Homer's account he was the son of Peleus, king of the Myrmidons in Phthiotis, a district of Thessaly, and of the Nereid or sea-goddess Thetis, and the grandson of Æacus. He is often called Peleides (Pelides) from his father, and Æacides from his grandfather. He was educated from his childhood by Phœnix, a friend of his father, who accompanied him to the Trojan war; and Cheiron, the centaur, instructed him in the art of healing. Achilles went to this war with the knowledge that he was to perish in it, his mother having foretold him that he should either live a long and inglorious life, or die young after a glorious career. He led his troops, the Myrmidons, against Troy in fifty ships. The Greeks ravaged the country round Troy, and destroyed twelve towns on the coast and eleven in the interior. These operations occupied nine years of the war, after which the siege proper commenced. Achilles was the bravest and handsomest of the Greeks, and the favourite of Hera (Juno) and Athena (Minerva). Nothwithstanding his services, Agamemnon had the imprudence to offend him by violently depriving him of his prize Briseïs, his own prize Chryseïs, having, by the advice of Calchas, been restored to her father the priest of Apollo. Achilles, by the advice of Thetis, surrendered the maid, but retired in wrath to his ships, vowing no more to support the Greeks. This forms the introduction to the Iliad, and constitutes the ground-plan of the poem. At the request of Thetis Zeus promises victory to the Trojans till the Greeks appease the anger of Achilles and persuade him to return. After various offers and embassies had been made in vain Patroclus persuaded Achilles to allow him to lead the Myrmidons to battle dressed in his armour. The Trojans were at first panic-struck, imagining him to be Achilles, but he was at length slain by Hector. Achilles now vowed revenge on the Trojans, and forgot his anger against the Greeks. At the request of Thetis, Hephæstus made him a new suit of armour. He attacked the Trojans and drove them back to their walls, slaying them in great numbers, chased Hector, who fled before him three times round the walls of Troy, slew him, and dragged

his body at his chariot-wheels, but afterwards gave it up to Priam, who came in person to beg for it. He then performed the funeral rites of Patroclus, with which the Iliad closes. It contains, however, several anticipative allusions to the death of Achilles, which is also mentioned in the Odyssey. He was killed in a battle at the Scæan Gate.

This outline of the story of Achilles is filled up by details either gathered from tradition or invented by later poets. In order to make him immortal, his mother, during his infancy, is said to have concealed him by night in fire, to destroy the mortal parts inherited from his father, and anointed him by day with ambrosia. His father discovering him one night in the fire, Thetis fled, and his father intrusted him to the care of Cheiron, who fed him with the hearts of lions and the marrow of bears, and gave him the education proper to a hero. According to another tradition, Thetis made him invulnerable by dipping him in the Styx, except in the heel by which she held him, and which the water did not touch. He is accordingly said to have received his fatal wound in the heel. To prevent his going to Troy, in which war it was predicted he should perish, Thetis sent him to the court of Lycomedes of Scyros, disguised as a girl. He was educated with the daughters of Lycomedes, one of whom, Deidameia, became the mother of Pyrrhus or Neoptolemus by him. Odysseus (Ulysses) went to the court of Lycomedes to discover him and induce him to join the war, in which Calchas had declared his aid indispensable. He succeeded by a stratagem. Presenting himself as a merchant, he offered the daughters of Lycomedes female ornaments and articles of attire for sale, among which he laid a shield and spear. He then raised an alarm of danger, on which the girls fled, and Achilles seized the weapons. He is said to have been killed either by Apollo in the likeness of Paris, or by an arrow of Paris directed by Apollo. According to another account he made love to Polyxena, a daughter of Priam, and induced by the promise of her hand on condition of his joining the Trojans, went unarmed to the temple of Apollo at Thymbra, and was there assassinated by Paris. Various stories are told of the relations of Achilles with Iphigenia. Iphigenia was brought to the camp at Aulis on the pretext that she was to be married to Achilles. According to one account Achilles interfered to rescue her from being sacrificed and sent her to Scythia; according to another he married her, and she became the mother of Pyrrhus. Others say he was united to her in the lower world, where he became a judge; but others again say he married Medea in Elysium. Annual sacrifices were offered to Achilles by the Thessalians at Troas by command of the oracle of Dodona. At Olympia and other places in Greece sacred honours were likewise paid to him.

ACHILLES TATIUS. See TATIUS (ACHILLES).

ACHILL ISLAND, or EAGLE ISLAND, an island on the west coast of Ireland, county Mayo, separated from the mainland of Connaught by a narrow strait called Achill Sound, now bridged over. It is of a triangular shape; greatest length, 15 miles; greatest breadth about 12½; area, 35,283 acres. Its surface is wild, barren, and mountainous, rising to elevations of 2000 feet and upwards, with some tremendous precipices round the coast. The inhabitants live by fishing or agriculture. There is a railway terminus opposite Achill, which is now visited by many tourists. Pop. (1901), 5064.

ACHROMATISM, meaning the absence of colour, is a term applied in optics to the production of colourless light, notwithstanding its having passed through a refracting medium. In the ordinary case, light, in so passing, is resolved into its simple elements, and on emerging exhibits the various hues which are obtained artificially by the prism, and which form the natural phenomenon of the rainbow. This decomposition of light is produced by the unequal refrangibility of its rays; and one consequence of it is, that when light is transmitted through a convex lens, the image formed by the concentration of the rays at its focus, instead of being distinct, is confused and surrounded more or less with a coloured fringe. The common glass telescope was thus rendered a very imperfect instrument, and many men of science of the highest name engaged in researches with the view of discovering a remedy. Newton at first thought it could be accomplished by combining lenses of different refracting powers. He was not successful, however, and latterly gave it up as impossible; nor had Euler much more success. The difficulty was first completely overcome by the celebrated optician John Dollond, who, after a series of experiments, conducted with great ingenuity and perseverance, was ultimately rewarded with the discovery that complete achromatism was attainable by the comparatively simple process of combining a convex lens of crown-glass with a concave lens of flint-glass, due care being taken to adjust the radii of curvature. Telescopes in which the object-glass is thus composed have received the name of *achromatic*, and in the same manner prisms are said to be *achromatic* when they disperse the light without developing colours.

ACID (sour; Latin, *acidus*). Formerly this name was applied in chemistry to a number of compounds, solid, liquid, and gaseous, having more or less the qualities of vinegar, which is itself a diluted form of acetic acid. The meaning of the term acid was therefore necessarily vague. Oxygen was supposed to be a constant constituent of acids, and the general properties assigned to these bodies were a tart, sour, taste, the power of changing vegetable blues into reds, of decomposing chalk and marble with effervescence, and of being in various degrees neutralized by lime. An acid is now defined as a substance containing hydrogen, which hydrogen is in whole or in part replaceable by metal, when the metal is presented in the form of a hydrate. An acid which contains but one atom of replaceable hydrogen is said to be monobasic; it is capable of forming only one series of salts. An acid which contains two atoms of replaceable hydrogen, and which can therefore form two series of salts, is called dibasic, and so on. It is found that in certain acids containing several atoms of hydrogen only one of which is replaceable by metals, two or more hydrogen atoms may be replaced by alcoholic radicles; such acids are said to be monobasic but polyatomic. The basicity and atomicity of an acid may or may not be the same, for polyatomic acids are monobasic or polybasic according to circumstances. Acids were formerly divided into *organic* and *mineral*, according to the sources from which they were derived; and although this distinction is by no means absolute, it is still sometimes considered convenient. The organic acids are by far the most numerous. See CHEMISTRY—Classification of Chemical Compounds.

ACIREALE, a seaport of Italy, on the coast of Sicily, in the province of Catania, to the north-east of the town of that name. It stands on a large and lofty mass of lava at the foot of Mount Etna, and consists of houses well built of lava, and arranged in regular, spacious streets. It has a thriving appearance, and carries on a large trade in corn, wine, fruit, and flax. Pop. (1901), 35,418.

ACIS, according to Ovid, a beautiful shepherd of Sicily, son of Faunus and the nymph Symæthis

Galatea passionately loved him, upon which account his rival, the Cyclops Polyphemus, crushed him to death with a mass of rock; and his blood, gushing forth from beneath it, was changed by Galatea into a river bearing his name.

ACNE, or FACE PIMPLES, a chronic inflammation of the hair sacs and of their sebaceous glands. It appears as small red pimples, chiefly on the face, chest, and back of young persons. These often arise when the mouths of the glands have been blocked up by plugs of fatty matter, and the top of these plugs often shows as a black point at the apex of the pimple, the blackness being caused by dirt. Frequent rubbing with soap and water is one of the most efficacious methods of treatment, because it softens the scarf skin and removes some of its layers, and with them the little plugs that block the glands. The plugs may also be removed by pressure (a little worm-like body being squeezed out), and the matter let out.—*Acne sycosis* is a form of the affection attacking hairy parts, especially the beard. It is a much more serious ailment, and requires poulticing, removal of hairs, &c.—*Acne rosacea* is another ailment which appears on the face, especially the nose, characterized by intense reddening of the skin (from overfulness of the blood-vessels), without swelling. The skin becomes thickened, and the nose is often considerably enlarged, the lines of overfull blood-vessels being easily seen. Persons who indulge too much in alcoholic liquors are subject to it, and therefore all stimulants should be avoided, and the patient should live plainly and temperately.

ACOLYTES, clerics in minor orders, or simply laymen or boys, whose office consists in lighting the candles, carrying tapers in processions, and generally assisting the bishops and priests in the performance of the church ceremonies.

ACONCAGUA, a province of Chili, bounded on the north by Coquimbo, on the east by the Andes, separating it from Argentina; south by Santiago and Valparaiso, and west by the Pacific. The mountain Aconcagua, whose summit is just within the Argentine Republic, rises to the height of 23,028 feet, and is believed to be the loftiest of the western hemisphere. The chief stream by which the province is watered is the river Aconcagua. Though a large portion of the province is covered with mountains, there is a good deal of cultivated ground, which produces in abundance maize, wheat, and other kinds of grain, pumpkins, melons, grapes, olives, &c. Area, 6224 square miles. Pop. in 1903, 131,255.

ACONITE (*Aconitum*), a genus of hardy herbaceous plants, of the natural order Ranunculaceæ, long known for their poisonous properties. Many of them are of great beauty, and several are cultivated in our gardens, especially the common wolf's-bane or monk's-hood (*A. Napellus*), so called from the form of its flowers, characteristic of the genus, which are shaped like a helmet or hood. These flowers, blue or yellow in colour, hang clustered round an upright stalk, and make the aconite a very imposing plant for ornamental garden borders. Some powerful medicines are prepared from the leaves and roots of monk's-hood. Applied externally they produce numbness of sensory nerves, and are used to relieve pain in certain forms of neuralgia, and in acute and chronic rheumatism. Given internally they diminish the force and frequency of the heart's action, render breathing slower, and are employed in acute fevers and inflammations. A poisonous dose causes cessation of breathing and of the heart's action. All the plants of this genus are poisonous; common monk's-hood is very virulent; but the most deadly seems to be the *A. ferox*, the *bish* or *bikh* of Nepal. See next two articles.

ACONITIC ACID ($C_6H_6O_6$), also called *equisetic acid*, a tribasic acid extracted from monk's-hood (*Aconitum Napellus*), or from horse-tail (*Equisetum fluviatile*), or prepared by the decomposition of citric acid by heat. It assumes the form of a tubercled cake or crust, is soluble in water, in alcohol, and in ether, takes the colour of amber under the action of heat, melts at 284° Fahr., and boils at 320°.

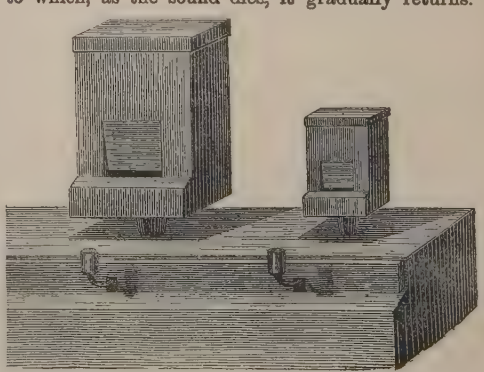
ACONITINE ($C_{30}H_{47}NO_7$), a vegetable alkaloid extracted from the leaves of monk's-hood and some other species of aconite. It generally forms white granules, and is a virulent poison, causing loss of sight, hearing, and feeling, and failure of the heart.

ACORUS. See SWEET-FLAG.

ACOSTA, GABRIEL, afterwards URIEL, a Portuguese of Jewish descent, was born at Oporto about the end of the sixteenth century. His father was a convert from Judaism and a zealous Christian. He brought up his son in his own faith. Young Acosta read and studied the Scriptures, particularly the New Testament, with great attention; but doubts having arisen in his mind he finally rejected the dogma of the divinity of Christ, and after hesitating between natural religion and Judaism, he embraced the latter. He went to Amsterdam, was circumcised, and took the name of Uriel. When he had become familiar with the habits of his co-religionists, he was struck with the differences between the practices of modern Judaism and the writings of Moses; and beginning by attacking the practices of the Jews, he ended by denying the divine mission of their lawgiver. The rabbis accused him before the magistrates as an infidel whose design was to undermine all religion. He was imprisoned and fined, and his book on the Traditions of the Pharisees confiscated. Latterly the persecution to which he was subjected so distracted his mind that he shot himself through the head with a pistol in 1647. He left an autobiography which has been published in Latin and German. Gützkow made him the subject of a tragedy.

ACOTYLEDONOUS PLANTS, plants without cotyledons or seed-leaves, otherwise called Cryptogams. See BOTANY.

ACOUSTICS, the science of sound. We are sensible of sound when we are affected by certain vibrations in the air or other matter in contact with our organs of hearing. In ordinary cases of hearing the vibrating medium is air, but fishes hear under water, and all substances capable of vibrating may be employed to propagate and convey sound. When a bell is struck it alters in shape, and while it continues to sound it vibrates about its natural figure, to which, as the sound dies, it gradually returns.



The vibrations of the bell are communicated to the particles of air surrounding it, and from these to particles outside them, until they reach the ear of the listener. (See WAVE.) Let two box-shaped pipes of

similar form, and whose linear dimensions are as 1 is to 2, be fixed on the wind-chest of an organ; it will be found that, on making them speak, the note of the small one will be what is called an octave higher than the note from the large one. The portion of air determined in size and shape by the interior of the small pipe on being disturbed passes through its initial condition twice for once that the air in the large pipe passes through its initial condition. When a pipe is long compared with the dimensions of its sectional area, the note is not affected sensibly by the sectional area. Suppose we take an ordinary flute, having all the holes stopped except the mouth; a player sounding the *fundamental note* sets the contained air vibrating in a way which we shall attempt to describe. The air at the mouth cannot differ much as to condensation and rarefaction from the atmosphere with which it is in contact; but as we move down the pipe from the mouth the contained air is in less free contact, and thus it may differ from the atmosphere as the rapidly-moving air at the mouth alternately gives what may be called an accumulated crush inwards and then a rush outwards. We have at the mouth a place of greatest motion, and of nearly invariable pressure; as we proceed inwards the motion is less, but the variation of pressure becomes greater, until, at the middle of the length of the tube, the motion is a minimum and the variation of pressure is a maximum. This point is called a *node*. At the end of the pipe the air is again in the same state as to variation of pressure as at the mouth. The mouth and end of the pipe are called *anti-nodes*. If the player blows so as to give the first overtone of the pipe, it will develop two nodes and three anti-nodes; the second overtone will have three nodes and four anti-nodes, and so on. If the end of the flute is closed, then there must always be a node at the stoppage, and the pipe sounds a fundamental note the same as that of an open pipe twice as long. When the overtones of a closed pipe are sounded there must always be an odd number of nodes. The frequencies of vibration therefore for the fundamental note and overtones of open pipes are 1, 2, 3, 4, . . . and for the fundamental note and overtones of closed pipes they are 1, 3, 5, 7, . . . When the flute is made to sound one of its overtones, if a hole be at one of the anti-nodes, opening that hole will not affect the pitch of the note. The openings in the flute alter the notes by determining the positions of anti-nodes, and consequently of the nodes. The distance between two nodes is half a wave-length.

Musical sounds are comparatively simple, and are combined to give pleasing sensations according to easy numerical relations. The *loudness* of a note depends on the *degree* to which it affects the ear; the *pitch* of a note depends on the *number* of vibrations to the second which produce the note; the *timbre* or *character* of a note depends on the *body* or *bodies* whose vibrations produce the sound, and is due to the form of the paths of vibrating particles. The gamut is a series of eight notes, which are called by the names Do, Re, Mi, Fa, Sol, La, Si, Do_2, and the numbers of vibrations which produce these notes are respectfully proportional to 24, 27, 30, 32, 36, 40, 45, 48. The numerical value of the interval between any two notes is given by dividing one of the above numbers corresponding to the higher note by the number corresponding to the lower note. The intervals from Do to each of the others are called a *second*, a *major third*, a *fourth*, a *fifth*, a *sixth*, a *seventh*, and an *octave* respectively. The interval from La to Do_2 is a *minor third*. An interval of $\frac{9}{8}$ is a *major tone*; $\frac{10}{9}$ is a *minor tone*; $\frac{16}{15}$ is called a *limma*. See also MUSIC, and TEMPERAMENT.

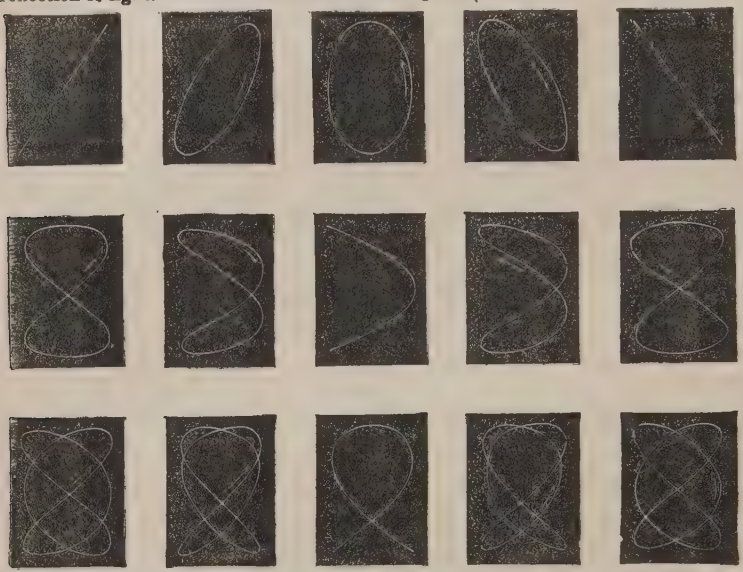
Returning to the vibrating column of air inside a flute-pipe, described above. Suppose the fundamental note is sounded, then the pipe is half a wave-length, $\frac{l}{2}$; let n be the number of vibrations per second producing the note, the velocity is nl. When other gases than air are employed, the length $\frac{l}{2}$ must be varied to produce a definite note of n vibrations to the second; thus we have a means of measuring the velocity of sound in different gases. In an analogous manner the longitudinal vibrations of rods of solid bodies may be employed to determine the velocity of sound in different substances. The determination of the velocity of sound in air by actual observation agrees with the number obtained in the manner indicated above. The velocity of sound in a gas is proportional to the square root of the absolute temperature. If we take 1090 feet per second as the velocity of sound in air at 0° C., $1090\sqrt{1 + \cdot00366\,t^{\circ}}$ will be the velocity in feet per second at any other ordinary temperature t°. Considering sound vibrations mathematically, we get $v = \sqrt{\frac{E}{D}}$, where v is velocity, E elasticity measured by the quotient of a small increase of pressure divided by the fractional decrease of volume, and D is the density. In the case of air and other gases E is equal to 1·41 P, 1·41 being the ratio of the specific heat of a gas at constant pressure to the specific heat at constant volume. For air and other gases, therefore, the formula is $v = \sqrt{1{\cdot}41\,\frac{P}{D}}$. The velocity is not influenced by the height of the barometer, for, no variation of temperature occurring, the density will vary as the pressure. The pressure per square foot when the barometer stands at 30 inches is about 2121 lbs., and the weight of a cubic foot of dry air at this pressure and 0° C. temperature is ·0807 lb.; taking 32·2 for gravity, the density will be $\frac{\cdot0807}{32{\cdot}2}$, and the formula will stand $v = \sqrt{1{\cdot}41\,\frac{2121 \times 32{\cdot}2}{\cdot0807}} = 1092$ feet per second.

Laws of the transverse vibrations of strings:—The pitch of the note given by a string (1) *varies inversely as the length of the string*; (2) *varies as the square root of the tension*; and (3) *varies inversely as the square root of the weight of the string*. (4) *Strings of the same length and density, but of different thicknesses, will vibrate in the same time if they are stretched with forces proportional to their sectional areas.* These laws are illustrated by an instrument called a sonometer, on which the length, tension, weight, &c., of a sounding string can be conveniently altered.

By M. Lissajous the vibrations of different tuning-forks were combined into one optical effect by means of little mirrors attached to the vibrating end of the tuning-forks. Light from a small hole is received on a mirror attached to a leg of the first tuning-fork; the beam is reflected, having the vibrations of this fork, to a mirror on a second tuning-fork, and it is reflected from this mirror into a telescope, when it has the resultant motion of the two vibrations. Owing to the retention of optical effects on the retina the eye, on looking through the telescope, perceives a continuous curve, which gradually passes through a series of phases, returning through these phases continuously. The figure in next page shows in the first five curves the curves and changes when the forks are in unison, the second row shows the curves when the forks differ by an octave, and the third when they differ by a fifth. These curves are similar to curves which may be obtained by setting up a piece of wire, which vibrates differently in two directions, in a vice, and twanging

it. The curves are traced by the bright point of the wire. The curves of M. Lissajous may be conveniently used to test whether tuning-forks are in unison, and they are found to be more to be depended on for this purpose than the ear.

Sound is reflected in a manner analogous to the reflection of light. When it is reflected from a plain



surface the reflected sound comes as if it was propagated from a point beyond the surface at a distance equal to the distance of the real point of propagation from the surface. Sounds produced in one focus of a hollow ellipsoid are reflected to the other focus. Whispering galleries are instances of the reflection of sound to a focus, or to form sound caustics. Echoes are familiar instances of reflection of sound. Lenses have been formed of collodion filled with different gases, and by means of these sound has been refracted in a manner analogous to the refraction of light by glass lenses. For a lucid and accurate treatment of the science of acoustics in an elementary manner the reader may consult Everett's English edition of Deschanel's Natural Philosophy.

ACQUI, a town of Italy, in the province of Alessandria, on the left bank of the river Bormida, 18 miles s.s.w. of Alessandria. It is the seat of a bishop's see, and contains a cathedral, a theological seminary, and a royal college. There are here, also, warm sulphurous baths, which draw a great many visitors. The manufacture of silks is carried on to a considerable extent. Some ruins still remain of the *Aquæ Statiellæ* of the Romans. Pop. (1901), 13,786.

ACRE (from the Anglo-Saxon *æcer*, which is the same word as the German *acker*, a field), a standard British measure of land. The imperial statute acre consists of 10 chains of 22×22, or 484 square yards, equal to 4840 square yards. The old Scotch acre contains 6146·8 square yards, the old Irish acre 7840 square yards. The English standard acre is used in the United States.

ACRE, St. Jean d' (ancient *Accho* and *Ptolemais*), a seaport of Syria, on a low promontory, forming the north-east side of the Bay of Acre. It early became a place of great strength and importance, and was considered the bulwark of Syria. In 1110 it was taken by the Crusaders, and continued to be an object of fierce contention between the Christians and Mohammedans till 1291, when the Sultan of Egypt remained its master. It then fell into decay, and made little figure till the end of the eighteenth century, when Ahmed Djezzar, the pasha of Sidon, fortified it anew and made it his residence. In 1799 it made a gallant defence against the French under Bonaparte, who, after a siege of sixty-one days, was obliged to retire. In 1832 it was taken after a siege of six months by Ibrahim Pasha, but in 1840 it was retaken by a British, Austrian, and Turkish fleet, and was restored to the Sultan of Turkey. It contains many ruins, but has also a number of well-built houses, bazaars, and mosques, and an active trade. A railway is being made to connect it and the neighbouring port of Haifa with Damascus. Pop. 10,000.

ACROCERAUNIA, now *Cape Linguetta*, a promontory of ancient Greece, in Epirus, running into the Adriatic, and formed by the termination of the Montes Ceraunii.

ACROCORINTHUS, a steep rock, nearly 1900 feet high, overhanging the city of Corinth, and crowned with the remains of Venetian and Turkish fortifications, ruins of mosques and dwelling-houses, and also a barrack with a few soldiers. It was famous in ancient times as the acropolis or citadel of Corinth, and on its top stood, according to Pausanias, a temple of Aphroditē (Venus). From the Acrocorinthus springs a fountain, the ancient Pirēnē, which was sacred to the Muses, and is often mentioned in ancient writers. The shape of the Acrocorinthus is that of a truncated cone. This remarkable fortress was several times taken and retaken in the war between the Greeks and Turks. The view from the top is one of the most charming in the world, and includes Mounts Helicon, Parnassus, and Cithæron; the Acropolis of Athens; the islands of Salamis and Ægina; the Gulfs of Corinth and Ægina, &c.

ACROGENOUS PLANTS. See Botany.

ACROLEIN, a compound of carbon, most familiar from the unpleasant odour caused by it during the slow combustion of a candle that has been blown out and is not yet perfectly extinguished. It is a general product of the slow distillation of fatty bodies.

ACROMEGALY, a serious but rare disease, of which the chief symptoms are great enlargement of the hands and feet, as well as of parts of the face, the lower jaw becoming larger and more projecting, the nose thickened and flattened, the eyes widely separated. The bones and soft parts both become enlarged; the hands become spade-shaped; the bones of the trunk increase in size, especially the upper vertebræ of the chest; the back becomes rounded, the head projects forwards and downwards. Other symptoms are weakness, headache, and defective sight. The disease may last many years, and no satisfactory treatment is known.

ACROPOLIS, the name given to the lofty citadel of an ancient Greek city, such as that of Athens.

ACROSTIC, a poem of which the first or last letters of each line are arranged so as to form some

name, motto, or sentence. A poem of which both first and last letters are thus arranged is called a double acrostic. For further mystification some poems have been written in which the first letter of the first line, the second of the second, and so on, form a name. Edgar Allan Poe has some puzzles of this kind. Acrostics were formerly much used in complimentary verses, the initial letters giving the name of the person eulogized. In some of the Hebrew psalms an arrangement of the letters in alphabetical order is used as an aid to memory. Psalm cxix. is the longest acrostic of this kind. It is divided into twenty-two parts, each line of the first part beginning with A, of the second with B, and so on through the alphabet. Acrostics have been often used in recent times by advertising tradesmen.

ACT, in dramatic poetry, one of the principal divisions of a drama, generally subdivided into scenes. The Greek dramas were not formally divided into acts, though the choral odes occurring at intervals have the effect of breaking up the dramas into similar divisions. The dictum that a drama should consist of five acts was first formally laid down by Horace, and is generally adhered to by modern dramatists in tragedy. In comedy no such distinction is observed. The five acts, though quite an arbitrary division, is not an inconvenient one for the development of a complicated plot, and its convenience has probably contributed to establish it, though various arbitrary rules have come to prevail in certain classes of composition without this recommendation, as, for example, the three unities of the Greek and French drama. It has been laid down as a rule that the plot should be presented in the first act, developed in the second, culminate in the third, while the fourth should prepare, and the fifth contain the denouement. Such rules of criticism are, however, little better than rules of pedantry, and are seldom much regarded by writers who have strength to develop their subject according to their own genius and its inherent requirements.

ACT, in law, signifies something formally done by a legislative or judicial body. The supreme and only independent legislative body in Great Britain consists of the two houses of Parliament together with the sovereign. An act of Parliament when it has received the royal assent is called formally a *statute*. (See STATUTE.) Judicial bodies either exercise by prescription or receive from Parliament the power to make formal decrees regulating their own procedure. Such decrees when made by the Court of Session in Scotland are called *acts of sederunt*. An order by which a curator is appointed by court is called in Scotland an *act of curatory*. In England any act by which a debtor renders himself liable to be adjudged a bankrupt is called an *act of bankruptcy*. (See BANKRUPT.)

ACT, in some universities, signifies a thesis (generally in Latin) maintained in public by a candidate for certain degrees. The person who 'keeps the act', as it is called, carries on a discussion before a presiding officer and with some appointed opponent or opponents, answering arguments or objections made to points in his thesis. The custom is now generally little more than a mere form.

ACTÆON, in Greek mythology, the son of Aristæus and Autonoë (a daughter of Cadmus), a great hunter. He was turned into a stag by Artemis (Diana) for looking on her when she was bathing (or as some say, for boasting that he was superior to her in hunting), and was torn to pieces by his own dogs. This incident is exhibited in various ancient works of art.

ACTA ERUDITORUM, the first literary journal that appeared in Germany. It commenced in 1682 and enjoyed a long existence and great popularity. Latterly, however, it began to decline in value and appeared irregularly, the last volume, for 1776, being published in 1782. The whole consists of 117 volumes in 4to.

ACTA SANCTORUM ('acts of the saints'), an account of the lives and deeds of ancient martyrs and saints, but more particularly the title of a voluminous work of this description, begun at the suggestion of the Jesuits in 1643, by John Bolland, a Jesuit of Antwerp, and after his death continued by other divines of the same order (known by the name of the *Bollandists*). Though now extending to over sixty volumes, it is still incomplete. The lives follow each other in the same order as the 'saints' days' in the calendar.

ACTINIA. See SEA-ANEMONE.

ACTINOMYCOSIS, a disease of men and animals, especially the latter, due to some kind of fungus obtaining entrance into the system by way of an abrasion of the skin or mucous membranes. It gives rise to tumours, swellings, or abscesses, but the effects vary according to the organ or part specially affected. The fungus commonly associated with it is the so-called 'ray fungus', which is parasitic on grasses and the cereal plants, and in cattle causes the disease known as 'wooden tongue', from its hardening effect on that organ. The chief remedy is iodine.

ACTINOZOA. See SEA-ANEMONE.

ACTION is the mode of seeking redress at law for any wrong, injury, or deprivation. Actions are divided into civil and criminal. Civil actions, according to English law, are divided into three classes: *real*, or those which concern real property only; *personal*, or those that concern contracts of various kinds and also offences or trespasses, with probates and administrations; and *mixed*, which lie both for the recovery of the thing as also for damages for the wrong sustained. Criminal actions are more properly called prosecutions. *Suit* has also much the same meaning as action.

ACTIUM, a promontory on the western coast of Greece, jutting out on the north-west extremity of Acarnania, not far from the entrance of the Ambracian Gulf (Gulf of Arta), at present called La Punta. It is memorable on account of the naval battle fought here between Antony and Octavianus (afterwards the Emperor Augustus), September 2, B.C. 31, in sight of their armies, encamped on the opposite shores of the Ambracian Gulf. The forces of Octavianus consisted of 80,000 infantry, 12,000 cavalry, and 260 ships of war; those of Antony, of 100,000 infantry, 12,000 cavalry, and 220 ships of war. Notwithstanding the advice of his most experienced generals to meet Octavianus by land, Antony, at the instigation of Cleopatra, determined upon a naval engagement. His vessels advanced, beautifully ornamented, and remarkable for their size; those of Octavianus, although smaller, were more skilfully managed. Both fleets were manned with the soldiers of the Roman legions, who considered a sea-fight like a battle on land, and the ships as forts which were to be stormed. Those of Antony threw firebrands and missile weapons from catapults, whilst those of Octavianus applied grappling-irons to the ships of the enemy, and boarded them. Soon after the beginning of the battle, before anything decisive had taken place, the timid Cleopatra fled with sixty Egyptian ships, when she perceived that Antony had been forced to extend his line, and that it would now be more liable to be broken by the enemy. Antony foolishly followed her, and fled with her to Egypt. The deserted fleet was not overcome, however, without making a brave resistance. Antony's troops,

which were drawn up on the shore, and had beheld with amazement the flight of their leader, after waiting seven days for his return went over to the enemy. Augustus enlarged the temple of Apollo at Actium in commemoration of his victory, dedicated to Neptune and Mars the standards which he had taken, and instituted games in commemoration of this battle, which made him master of the world. He also built on the opposite shore the city of Nicopolis ('city of victory').

ACT OF SETTLEMENT, the name given to the statute 12 and 13 Will. III. cap. ii., by which the succession to the throne of the United Kingdom, in the event of King William and Queen Anne dying without issue, was settled on the Princess Sophia, electress of Hanover, and the heirs of her body being Protestants. The Princess Sophia was the youngest daughter of Elizabeth, queen of Bohemia, daughter of James I. By this act, George I., son of the Princess Sophia, succeeded to the crown on the death of Queen Anne.

ACT OF TOLERATION, the name given to the statute 1 Will. and Mary, cap. xviii., by which Protestant dissenters from the Church of England, on condition of their taking the oaths of supremacy and allegiance, and repudiating the doctrine of transubstantiation, were relieved from the restrictions under which they had formerly lain with regard to the exercise of their religion according to their own forms. Further acts of toleration were afterwards passed, and now Dissenters, Roman Catholics, and Jews alike enjoy all the privileges of the constitution.

ACT OF UNIFORMITY. See NONCONFORMISTS.

ACTOR, in the drama, is one who represents some part or character on the stage. Among the Greeks, with whom dramatic exhibitions originated at an early period, a simple chorus, who sung hymns in honour of Bacchus, at first constituted the whole entertainment. A declaimer, who recited the adventures of heroes, was introduced by Thespis for the sake of variety. Æschylus changed the declamation into the form of a dialogue between two persons, and Sophocles added a third. To this number the actors in the Greek drama were limited; and the Romans adopted the same rule in tragedy. In comedy the number of actors was not restricted. In modern times the number is regulated by the nature of the piece to be performed. Actresses, in the drama, appear to have been wholly unknown to the ancients, men or eunuchs always performing the female parts. Latterly actresses did appear under the Roman Empire, but were very ignominiously treated. Charles II. is said to have first encouraged the public appearance of actresses in England; and there is evidence that the queen of Charles I. performed in a court theatre. Actors were long excluded from good society, and actresses still longer, and perhaps the English were the first who admitted the most distinguished into their first circles. At Athens actors were highly honoured. At Rome they were despised, and deprived of the right of suffrage. The reason of this difference is, that among the Greeks the actors were freeborn citizens, and the dramatic performances had their origin in the sacred festivals; but among the Romans the drama was introduced by persons of the lowest class, Etruscan players and peasants of Atella. Actors and actresses continued for a long time to be treated with little regard in France, after they had been admitted into good society in England. Marriages of Englishmen of high rank with actresses are not rare. In some parts of Germany actors were formerly buried like suicides in a corner of the burying-ground, separated from the other graves.

ACTS OF THE APOSTLES, one of the books of the New Testament, written in Greek by St. Luke, the author of the Gospel which bears his name. It is addressed to Theophilus, of whom nothing is known, and is evidently intended as a continuation of the Gospel, which the author himself calls his 'first book' (Acts i. 1). It has been almost universally received, and is generally thought to have been written A.D. 70 to 80, but in what place is doubtful. Jerome says at Rome; Grotius and Lardner think in Greece; Michaelis, in Alexandria. Baur and a few other modern critics have alone questioned the authorship of the Acts. The book embraces a period of about thirty years, beginning immediately after the resurrection, and extending to the second year of the imprisonment of St. Paul in Rome. Very little information is given regarding any of the apostles, excepting St. Peter and St. Paul, and the accounts of them are far from being complete. Thus the history of St. Peter terminates with the death of Herod, although that apostle is considered to have lived and preached twenty-four years longer. It describes the gathering of the infant church after the death of its founder; the fulfilment of the promise of Christ to his apostles in the descent of the Holy Ghost; the choice of Matthias in the place of Judas, the betrayer; the testimony of the apostles to the resurrection of Jesus in their discourses, attested by miracles and sufferings; their preaching in Jerusalem and in Judea, and afterwards to the Gentiles; the conversion of Paul, his preaching in Asia Minor, Greece, and Italy, his miracles and labours. Its place is generally between the gospels and the epistles; but in some MSS. it is found after the thirteen Catholic epistles. The style of this work, which, as above said, was originally composed in Greek, is generally regarded as being purer than that of the other canonical books of the New Testament. The text of the Acts is liable to a very great variety of readings.

ACTUARY (Latin *actuarius*, a public clerk) is a name usually applied to an accountant whose business is to compute the probabilities of life in connection with the investment of money, so as to form a basis for tables of life assurance, annuities, and reversions; or generally to make the necessary computations regarding risks undertaken by insurance companies, &c. There are two societies of actuaries in the United Kingdom, both now incorporated by royal charter, namely, the Institute of Actuaries of Great Britain and Ireland, established in London in 1848, and the Faculty of Actuaries in Scotland, established in Edinburgh in 1856. The fellows of the two bodies respectively employ the abbreviations F.I.A. and F.F.A.

ACUPRESSURE, a means of arresting hæmorrhage in wounds produced by the cutting of arteries in surgical operations. Acupressure was introduced by Sir James Simpson in 1859. The means of arresting hæmorrhage generally in use up till this time was ligature of the artery. Acupressure consists in compressing the severed artery above the orifice, that is, on the side nearest the heart, with the middle of a needle introduced through the sides or flaps of the wound. The principle is applied in a variety of ways according to the nature of the wound. The advantages claimed for acupressure are, that it can be applied more rapidly, and arrests hæmorrhage sooner than ligatures, that it has less tendency to produce suppuration and pyæmia, and that it enables the presence in the wound of a foreign body to be much sooner dispensed with. But latterly catgut ligatures have been introduced, and have been found to possess advantages over that method, as the catgut is absorbed, and the foreign substance removed by a natural process.

ACUPUNCTURE, an operation in which the insertion of needles is employed for the cure of different species of rheumatism, eye diseases, &c. It is easily performed, gives little pain, causes neither bleeding nor inflammation, and seems at times of surprising efficacy. The invention of acupuncture is ascribed to the Chinese and Japanese, who acquire great skill in the use of it, by practising on a figure of wood or pasteboard. It was first known in Europe in the seventeenth century, but had been forgotten till some French surgeons revived it in this. It is now chiefly used for alleviating pain, sometimes by using the needles as conductors of galvanism, sometimes by using hollow needles through which a sedative is injected. This is found effectual in affording immediate relief in neuralgia. The mere insertion of the needle itself often gives temporary relief.

ADAGIO (Italian) expresses a slow time. Sometimes the word is repeated to denote a still greater retardation in the time of the music.

ADÂL. See ADEL.

ADALBERT, or ALDEBERT, a native of France, who preached the gospel in 744 on the banks of the Main. He is remarkable as the first opponent to the introduction of the rites and ordinances of the Catholic Church into Germany. He dared to assert that the multiplication of saints and relics, and the practice of confession, were superfluous. On this account he was accused of heresy by Boniface, the apostle of Germany, and condemned by two councils, at Soissons in 744, and at Rome in 745. Having finally made his escape from prison he is said to have been murdered by some peasants on the banks of the Fulda.

ADALBERT, Archbishop of Bremen and Hamburg, a descendant of a princely house of Saxony, received his office in 1043 from the Emperor Henry III., whose relation, friend, and follower he was. He accompanied Henry to Rome in 1046, where he was a distinguished candidate for the Papal chair. Pope Leo IX., in whose behalf he had spoken at the synod of Mainz (1049), made him his legate in the north of Europe (1050). He superintended the churches of Denmark, Norway, and Sweden, but aspired in vain to the dignity of pope, or patriarch of the North. During the minority of Henry IV., who afterwards became emperor, he usurped, in concert with Hanno, archbishop of Cologne, the guardianship of the young prince and the administration of the empire, and gained an ascendency over his rival by indulging the passions of his pupil. After Henry had become of age to rule, Adalbert exercised the government without control in his name. His pride and arbitrary administration induced the German princes in 1066 to remove him by force from the court; but after a short contest with the Saxon nobles, who laid waste his territory, he recovered his former power in 1069, and held it till his death at Goslar, March 17, 1072. He excelled his contemporaries in princely qualities, in talent, and in strength of mind; and if he had possessed magnanimity, and a wise spirit of moderation, he would have deserved the surname of *Great*, which has been given him. The injustice and tyranny which stained his administration were mainly instrumental in producing the confusion and calamities in which the reign of Henry IV. was involved.

ADALBERT OF PRAGUE, the apostle of Prussia proper, son of a Bohemian nobleman, was born in 939, educated in the cathedral of Magdeburg, and appointed the second Bishop of Prague in 983. He laboured in vain to convert the Bohemians from paganism, and to introduce among them the ordinances of the Church of Rome. Discouraged by the fruitlessness of his pious zeal, he left Prague (988) and lived in convents at Montecasino and Rome, until the Bohemians, in 993, recalled him. But after two years he again left them, disgusted with their barbarous manners. He returned to Rome, and soon followed the Emperor Otho III. to Germany; on which journey he baptized, at Gran, St. Stephen, who subsequently became King of Hungary. After a visit to the monasteries of Tours and Fleury, he proceeded to Gnesen to meet Boleslaus, duke of Poland; and being informed that the Bohemians did not wish to see him again, he resolved to convert the pagans of Prussia. But he lost his life in the attempt, being murdered by a peasant, April 23, 997, near what is now Fischhausen. His body was bought by Boleslaus for its weight in gold, and became famous for its miraculous power. Its influence was greater than that of the saint himself. The Bohemians, who before had refused to receive the ordinances of the church, now suffered them to be introduced into Prague, on the sole condition that these miraculous bones should be transferred to their city.

ADALIA, a seaport on the south coast of Asia Minor, in the province of Konieh, finely situated on the Gulf of Adalia, from which the houses rise in terraces like an amphitheatre. It lies in a fertile but hot and unhealthy locality, producing grain, figs, oranges, wine, &c. It has a small but good port, and carries on a considerable trade; exporting grain, timber, cattle, valonia, &c. It was anciently called Attalia, later Satalia. Pop. 25,000.

ADAM, ALEXANDER, LL.D., an eminent grammarian and writer on Roman antiquities, was born in Morayshire in 1741, of humble parents, who, however, contrived to give him a good education He removed to Edinburgh in 1758, where, after undergoing great hardships in prosecuting his studies, he became in 1761 head-master of Watson's Hospital, and in 1768 rector of the High School. In 1772 he published his Latin grammar, under the title of The Principles of Latin and English Grammar. It possesses considerable merit, and is well adapted for teaching the grammars of both languages at the same time. He also compiled Roman Antiquities (1791, 8vo), the work by which he is most widely known, though it is now in a great measure superseded by more recent treatises; Summary of Geography and History (1794, 8vo); Classical Biography; and an abridged dictionary, entitled Lexicon Linguæ Latinæ Compendiarium (1805, 8vo)—all of which became popular in schools. He died in 1809.

ADAM, ROBERT, an eminent architect, was born in Edinburgh in 1728. He was the second son of William Adam, of Maryburgh, Fifeshire, an architect of considerable reputation. While at the University of Edinburgh he formed intimacies and friendships with distinguished men, which smoothed the way to his future eminence. In 1754 he travelled to the Continent, made a voyage to Spalatro in Dalmatia, and resided several years in Italy. On his return he was appointed architect to the king, an office which he held for six years, when he resigned it to become a member for Kinross-shire in the British Parliament. In 1764 he published a work in large folio, enriched with plates, entitled Ruins of the Palace of the Emperor Diocletian at Spalatro in Dalmatia. By this time, in conjunction with his brother James, he carried on an extensive professional business, being much employed by the English nobility and gentry in constructing modern and embellishing ancient mansions. In 1773 the brothers commenced to publish in numbers The Works in Architecture of R. and J. Adam, which contain many elegant and splendid designs. Before this they had erected the fine structure called the Adelphi Buildings in London. As specimens of Adam's archi-

tecture in Scotland we may mention the Register House in Edinburgh and the Royal Infirmary in Glasgow. Robert Adam died in 1792, and was buried in Westminster Abbey; his brother James, who was also eminent as an architect, died in 1794.

ADAM AND EVE, the names given in Scripture to our first parents. The name Adamah implies redness, and is applied to the earth in Gen. ii. 7. Eve (*Heva* or *Chava*, living) is the name given by Adam to his wife after the fall, Gen. iii. 20. Previously to this (Gen. ii. 23) he called himself Ish, which in Hebrew signifies a man of worth or substance, and her Isha. Adamah is a generic name (Gen. v. 2), but it is also used as the distinctive appellation of the first man. There are two distinct accounts of the creation of Adam given in the book of Genesis, ch. i. 26–28; ii. 7–25. The first is a summary account contained in the general account of creation, the second is an amplification, with numerous details omitted in the first narrative, of the creation of man himself. The name given to the Deity in the first narrative is Elohim, that in the second Jehovah Elohim. From this and some alleged discrepancies, which consist rather in order and form of narrative than in substance—for example, the creation of man and woman being spoken of together in the first narrative, and separately, with some incidental observations on the creation of plants and animals interposed, in the second—some critics have assumed that we have here two distinct traditions put together by a compiler apparently without effort to reconcile them. It is accordingly in the second of these so-called traditions that all the details of history of our first parents are contained. In the terminology of the critics the various sections are distinguished as Jehovist and Elohist. The Jehovist section extends to the end of ch. iv., when the Elohist writer is supposed to begin again. Thus the genealogies of ch. iv. v., in which the names have a remarkable similarity, are supposed to be different versions of the genealogy of the same family by the two authorities, in which Cain is asserted by the one and Seth by the other to be the eldest son of Adam, although it is to be observed also that part of the genealogy of Seth, where the similarity of names begins, is contained in ch. iv. The three sections are thus united by connecting links, a summary account of the creation of man, which forms the first detailed subject of the second section, being given in the first, and the genealogy of the family of Seth, which is given entire in the third section, being begun in the second—an arrangement which seems to indicate rather a divisional treatment of the subject of the history than a change of authorship. The comprehensiveness of the subject and the brevity of the author seem to afford a natural explanation of alleged inconsistencies.

As a history of the commencement of the human race the story of our first parents contained in the book of Genesis is remarkable in several respects. Taken in connection with the early history of their descendants, it deals with all the leading problems which speculative science has propounded in regard to the early progress of mankind; the origin of the race itself, the origin and diversification of language, the origin of moral distinctions, the beginning of religious worship, the invention of useful and agreeable arts, are among the topics on which it supplies us with authoritative information, while, at the same time, the information supplied is commonly of a nature rather to raise than to satisfy our curiosity. If we take the account of the creation itself it is undoubted that men of science have found in it indications of a knowledge superior to that of the day in which it was written, and which altogether differentiates it from the extravagant myths with which the majority of ancient nations supplied the lack of knowledge of their origin, yet no man of science has been able by any consistent hypothesis to reconcile it with the ascertained facts of natural science. The origin of evil is explained in a simple and natural manner by the imposition and infraction of a test of obedience to divine command; but this solution imports with it a problem of greater difficulty and magnitude, on which moralists have exercised themselves in vain—that of the transmission of moral evil by vicarious responsibility. The origin of language is ascribed to a double source. We are told in the first chapter that God gave names to various natural objects and phenomena, and in the second that when he had created Adam he brought to him the various living animals, to which Adam gave names. Language is thus described as a divine gift developed by human intelligence, and, it would seem, by an instinctive exercise of that intelligence, or, possibly, by a divinely-inspired knowledge. Man, we are told, was made in the image of God; this is commonly understood to refer to the higher, or spiritual and intelligent nature of man. Some critics refer the expression to the anthropomorphic notions of the Jews, and suppose that it implies a bodily as well as a spiritual resemblance; but it is a mere assumption that the Hebrew writers of the Old Testament ascribed physical attributes and actions to God in any other than a metaphorical sense; and it ought to be remembered that in the Pentateuch itself the making of any image of God is expressly forbidden, which is inconsistent with the notion that the Jews regarded God as a glorified man.

The history of our first parents has been subject to a great variety of interpretations. These may be classed under three general heads: 1st, mythical; 2d, allegorical; 3d, historical.

The theory which regards the history merely as a myth, or as a collection of myths, similar to that by which nearly every people, ignorant of its origin, attempts to construct a definite historical commencement out of some vague recollections or conjectures stretching beyond the range of authentic history, seems to indicate an impenetrable critical blindness in those who adopt it. There are, indeed, numerous eastern myths of this kind, which seem to imitate or rather to parody the account in Genesis, and which probably indicate an imperfect acquaintance with the substance of it among the peoples by whom they were framed; but there are certain circumstances which broadly distinguish all these myths from the account in Genesis. None of them, to begin with, have the comprehensiveness of that account, or embrace so many of the problems regarding the origin of things and the early course of events in the world which excite inquiry. None has a moral purpose so simple, comprehensive, and consistent, or a style of narrative so plain, concise, and historical. All of them contain extravagant, grotesque, and unnatural circumstances, incidents, or speculations in regard to the origin and history of the race, which stamp them with a non-historical character, while the Bible narrative alone mingles the natural and supernatural without confusion, and ascribes to men a uniformly human character and conduct. Finally, none of them has such wide relations and ramifications with future events, or passes so naturally into the stream of authentic history. Much of this will also apply to the supposition that the intention of the writer was purely allegorical. It seems almost evident from the style of the narrative that no such design was intended to be avowed by the writer himself, although the events recorded of our first parents border so closely on the supernatural that it

is impossible to say how far a strictly literal account of them could have been given, or what circumstances we are to regard as real and what as figurative or suggestive. The theories which regard the narrative as historical differ chiefly as to its source. Some suppose it to have been immediately communicated to Moses by divine inspiration, others to have descended by a well-preserved tradition from the progenitors of our race, and to have been recorded by Moses, probably with the aid of earlier documents, and under a divine impulse and guidance. There are numerous Talmudical additions to the Scripture narrative of an extravagant character. Similar legends are contained in the Koran.

ADAMANT. See DIAMOND.

ADAMANTINE SPAR. See CORUNDUM.

ADAMAWA (formerly *Fumbina*), a kingdom of Central Africa, between lat. 6° and 11° N., and lon. 11° and 17° E., now mostly belonging to Germany. Much of the surface is mountainous, the mountains rising to perhaps 9000 or 10,000 feet. The principal rivers are the Benue and its tributary the Faro. The chief town is Yola, which along with part of the territory is under British influence and protection. A great part of the country is covered with thick forests, though there are also extensive and splendid pasture lands and cultivated fields. The native inhabitants are industrious and intelligent, but they have been in a great measure subdued by the Mohammedan Fellatahs, who possess innumerable slaves. Slaves and ivory are the chief articles of trade.

ADAMITES, the name of a Christian sect, said to have existed in the second century; and also of a band of heretics which in 1421 appeared in Bohemia, during the commotions occasioned by the doctrines of Huss. They were so called because both men and women were said to appear naked in their assemblies, either to imitate Adam in the state of innocence or to prove the control which they possessed over their passions. The tradition respecting the former sect of this name appears to have had its origin in a name of derision given to the Carpocratians. (See GNOSTICS.) The accounts of the other sect are not to be relied upon with more certainty. These were also called *Picards*, from the founder of their sect, Picard (perhaps also *Beghards*). They appeared about the year 1421 on an island in the river Lusinicz, where Zisca surprised them, but was not able to destroy the whole sect. In the following year they were widely spread over Bohemia and Moravia, and especially hated by the Hussites (whom they resembled in hatred towards the hierarchy) because they rejected the doctrine of transubstantiation. They subsequently formed one sect with the remaining Taborites, who have accordingly been confounded with them.

ADAMNAN, ST., born in Ireland about 624, was elected abbot of Iona in 679. He visited the court of King Aldfrid of Northumberland in 700, and appears at this time to have been induced to adopt the Roman time for the keeping of Easter. He failed on his return to introduce it in Iona, and the disappointment is said to have hastened his death, which occurred about 703 or 704. He wrote a work, once much esteemed, De Situ Terræ Sanctæ, &c., said by Bede to have been founded on information received from a French bishop named Arculf, who was wrecked on the west coast on his return from the Holy Land, and was entertained by the abbot at Iona. On his visit to the court of Northumberland Adamnan presented this work to Aldfrid, who caused it to be widely circulated. He is now best known as the author of a Life of St. Columba. The Life of St. Columba was published at Antwerp in 1725. The best edition is that of Reeves, published by the Irish Archæological and Celtic Society in 1857. A somewhat modified re-issue of this edition, with the addition of an English translation of the Life, was published at Edinburgh in 1874 by Messrs. Edmonston and Douglas, in their series, The Historians of Scotland.

ADAMS, JOHN. See PITCAIRN'S ISLAND.

ADAMS, JOHN, second president of the United States, was born at Braintree (now Quincy), Massachusetts, 19th October, 1735. He was educated at Harvard University, and adopted the law as a profession. His attention was directed to politics by the question which began to excite the colonies as to the right of the English Parliament to impose taxation upon them, and he took up a position strongly opposed to the claims of the mother country. In 1765 he published in the Boston Gazette some essays, which were reprinted in London in 1768, under the title of A Dissertation on Canon and Feudal Law, the subject really treated in which was the government of the colonies and the rights of the colonists. In 1774 he was chosen a delegate from Massachusetts to the first continental Congress. He strenuously advocated resting the assertion of rights made by this body on the laws of nature, and when the substance of the resolutions was agreed to he was appointed to put them into shape. On his return he was appointed a member of the provincial congress, which had already begun to take aggressive measures against the home government. In 1775 he again attended the continental Congress at Philadelphia, in which he set himself in determined opposition to all attempts at reconciliation with the home government. He failed in opposing a petition to the king, but succeeded in persuading Congress to take means of national defence, and assume the responsibility and direction of the military proceedings in Massachusetts. To secure the good-will of Virginia he proposed Washington for the command of the army. Next session he was appointed a member of committee on naval affairs, and drew up the regulations which still form the basis of the American naval code. At the beginning of 1776 he accepted the post of chief-justice of Massachusetts, on the understanding that he should not be required to act till the close of the revolution, but he soon after resigned the appointment. He published at this time Thoughts on Government, applicable to the Present State of the American Colonies, in which he supported self-government by the different colonies with confederation. On 13th May, 1776, he seconded the motion for a declaration of independence proposed by Lee of Virginia, and was appointed a member of committee to draw it up. The declaration was drawn up by Jefferson and fought through Congress by Adams. He was also appointed a member of the committee on foreign relations. He limited his views to commercial treaties, being opposed to receiving political assistance from France. He was next appointed chairman of the board of war and ordnance, a position which he held for eighteen months. Near the end of 1777 he was sent to France on a special mission, and for ten years he resided abroad as representative of his country in France, Holland, and England. He succeeded in negotiating various loans with Holland, and after taking part in the peace negotiations was appointed, in 1785, the first ambassador of the United States to the court of St. James. He was recalled in 1788 and elected vice-president of the republic under Washington. In 1790 he published Discourses on Davila, in which he opposed the principles of the French revolution. In 1792 he was re-elected vice-president, and at the following election he became president. The state was then divided into two parties, the federalists, who favoured aristocratic and were suspected of monarchic views, and the republicans. Adams adhered to the former party, with

which his views of government had always been in accordance, but the real leader of the party was Hamilton, who had been secretary of the treasury under Washington, and who afterwards succeeded him in command of the army. Adams and Hamilton did not agree. Hamilton did his utmost with his own party to prevent the election of Adams, and his term of office proved a stormy one, which broke up and dissolved the federalist party. His re-election was again opposed by the intrigues of Hamilton, which ended in effecting the return of the republican candidate Jefferson. Thus it happened that when Adams retired from office his influence and popularity with both parties were at an end, and he sunk at once into the obscurity of private life. He strongly felt and resented the neglect with which he was treated, and he occupied his leisure in writing various historical memoirs and defences of his own administration. Living to a great age he survived the contemporaries who had despised him, and became, as one of the last survivors of the revolution, a hero to the following generation. In 1820 he became a member of a state convention to revise the constitution of Massachusetts. He died 4th July, 1826, on the fiftieth anniversary of the declaration of independence, and on the same day as Jefferson, who had been engaged with him in drawing it up. Adams's works, which have been ably and carefully edited by his grandson Charles Francis Adams, contain some of the most interesting and valuable memorials of the revolution.

ADAMS, JOHN QUINCY, sixth president of the United States, son of John Adams, second president, was born at Braintree, Massachusetts, 11th July, 1767. In his eleventh year he accompanied his father on his first embassy to France, and was placed at school near Paris. He returned with his father in about eighteen months, but soon came back to Europe, and went to school in Holland and to the University of Leyden. At the age of fifteen Francis Dana, his father's secretary of legation, who had been appointed on a diplomatic mission to Russia, took him with him as his private secretary. After fourteen months' stay in Russia he travelled back alone through Sweden and Denmark to the Hague. Soon after his father's appointment as ambassador at London he returned home to complete his studies. He graduated at Harvard in 1788, and entered the office of Theophilus Parsons, a leading lawyer, where he remained three years. In 1791 he was admitted to the bar. He now began to take an active interest in politics. He wrote a series of letters to the Boston Sentinel, under the signature of 'Publicola,' in reply to Payne's Rights of Man, and in 1793 defended Washington's policy of neutrality under the signature of 'Marcellus.' These letters attracted attention, and in 1794 Washington appointed him minister to the Hague. In 1798 he received a commission to negotiate a treaty of commerce with Sweden. On his way he passed through Silesia, of which he wrote an account in some letters which were published. On the accession of Jefferson to the presidency he was recalled. The federalist party (that of his father), which was now declining, had still sufficient influence in Massachusetts to elect him to the senate in 1803. On an important question of foreign policy, that of embargo, he abandoned his party, and incurred the suspicion of doing so to promote his interest with the dominant party. Having lost his re-election on this account, he immediately resigned his seat and retired to the professorship of rhetoric at Cambridge, which he held from 1806 to 1809. On the accession of Maddison he was appointed (1809) ambassador to Russia. He assisted in negotiating the peace of 1814 with England, and was afterwards appointed resident minister at London. On the accession of Monroe to the presidency he was offered and accepted the post of secretary of state, and at the expiration of Monroe's double term of office he succeeded him in the presidency (1825). He was not very successful as a president, and at the end of his term (1829) he was allowed to retire into private life as wholly abandoned as his father had been. In 1831 he was returned to Congress by Massachusetts, and continued to represent this state till his death. His efforts were now chiefly on behalf of the abolitionist party. He died 21st February, 1848.

ADAMS, SAMUEL, an American statesman, second cousin of President John Adams, was born in Boston, United States, September 27th, 1722, and was educated at Harvard College. When he took the degree of M.A. in 1743 he proposed the following question: 'Whether it be lawful to resist the supreme magistrate if the commonwealth cannot be otherwise preserved?' He maintained the affirmative, and this collegiate exercise furnished a very significant index to his subsequent political career. On leaving the university he engaged in the study of divinity with the intention of becoming a clergyman, but did not pursue his design. From his earliest youth his attention was drawn to political affairs, and he occupied himself, both in conversation and writing, with the political concerns of the day. He became so entirely a public man, and discovered such a jealous, watchful, and unyielding regard for popular rights, that he excited the general attention of the patriotic party, and they took the opportunity in the year 1765 to place him in the general court of Massachusetts. From that period till the close of the revolutionary war he was one of the most unwearied, efficient, and disinterested assertors of American freedom and independence. He was one of the signers of the declaration of 1776, which he laboured most indefatigably and unhesitatingly to bring forward. He was an active member of the convention that formed the constitution of Massachusetts; and after it received effect he was placed in the senate of the state, and for several years presided over the body. In 1789 he was elected lieutenant-governor, and held that office till 1794, when he was chosen governor, and annually re-elected till 1797. He then retired from public life, and died at his house in Winter Street, Boston, October 2, 1803, in the eighty-second year of his age. Adam's writings were mostly ephemeral; but it is noteworthy that in an oration on American independence, delivered on 1st August, 1776, he called the English a nation of shopkeepers, as Napoleon afterwards did, perhaps borrowing his phrase.

ADAM'S APPLE. See LARYNX.

ADAM'S NEEDLE. See YUCCA.

ADAMSON, PATRICK, a Scottish divine and Latin poet, was born in Perth, 1543, and received his education at St. Andrews. In 1566 he went to France as tutor to a young man, and with his pupil lay concealed for seven months at Bourges, thus escaping the massacre of St. Bartholemew. On his return to Scotland in 1573 he was appointed minister of Paisley, and in 1576, by the favour and interest of the Regent Morton, was raised to the archbishopric of St. Andrews. In this elevated situation, which he had only gained by abandoning the principles which he previously professed, he incurred the contempt and provoked the hostility of the Presbyterians. James VI., however, patronized him, and sent him as his ambassador to England, where his eloquence and address gained him admirers, and raised such a tide of popularity in favour of the young king his master that the jealousy of Elizabeth forbade him again to ascend the pulpit while at her court. His principal

objects in England were to gain friends for his master among the nobles, and to support the cause of episcopacy in Scotland. In 1584 he was recalled, and when brought before the church courts on account of his conduct (he being still regarded as a mere presbyter in the Kirk of Scotland), made such lame excuses that, at a synod held in St. Andrews in 1586, he was accused and excommunicated. His appeals to the king, the estates, and the assembly, were in vain. He is said to have made a written recantation of his errors, but Spottiswoode questions its genuineness. His life continued a scene of perplexity; even the monarch grew deaf to his petitions, and alienated the revenues of his see in favour of the Duke of Lennox, so that now, in addition to the indignities offered to his office, he had to bear the pangs of indigence in the midst of a forlorn and starving family. He died in 1592. He was a voluminous writer, but much that he wrote was intended to serve the purpose of the hour. Among his writings are translations of some of the books of the Bible in Latin verse. He also wrote a history of his own times.

ADAM'S PEAK, one of the highest mountains in the island of Ceylon, about 45 miles to the eastward of Colombo. It is of a conical shape, 7420 feet high, and can be seen in clear weather from sea at a distance of 150 miles. From its solitary position and immense height above the surrounding country the peak forms a striking and awe-inspiring object, and has been for centuries venerated by the inhabitants. On the top, under a sort of open pagoda, is the sacred footmark, a natural hollow in the rock, artificially enlarged, and bearing a rude resemblance to a human foot, which by the Brahmans is believed to be the footprint of Siva, by the Buddhists that of Buddha, and by the Mohammedans that of Adam. Devotees of all creeds here meet and present their offerings (consisting chiefly of rhododendron flowers) to the sacred footprint, finishing their devotions by a draught from the sacred well. The ascent of the mountain is very steep, and towards the summit is assisted by steps cut and iron chains rivetted in the rock, the last 40 feet being accomplished by means of an iron ladder. The top is an area of 64 feet by 45.

ADANA, an ancient town in the south-east of Asia Minor, capital of province of same name, on the Sihun, about 25 miles from its embouchure in the Mediterranean, and about 30 miles from its port Mersina, with which, and with Tarsus about halfway between, it is connected by railway. It is situated on a gentle declivity, with a plain stretching in front to the sea. It is a gloomy town, but is well built, and contains some good bazaars. The trade is large, grain, cotton, sesame, wool, raisins, gum tragacanth, &c., being exported. Pop. 45,000.

ADANSON, MICHEL, an eminent French naturalist, was born at Aix, in Provence, of Scottish extraction, in 1727. His parents intended him for the church, and procured him a prebend, which supplied him with the means of education. He made natural history his favourite study, and chose Réaumur and Bernard de Jussieu for his guides. His emulation was roused by the brilliant success of the system of Linnæus. In the prosecution of his favourite pursuits he made several journeys to regions never before visited by man. In 1748 he went to the river Senegal, in the belief that the unhealthiness of the climate would, for a long time, prevent naturalists from visiting that country. He collected, with all the zeal of an enthusiast, invaluable treasures in the three kingdoms of nature; and, perceiving the defects in the established classification of plants, endeavoured to substitute another more comprehensive. He also prepared exact maps of the countries through which he travelled, and compiled dictionaries of the languages of the different tribes with whose manners and customs he had become acquainted. After a residence of five years in an unhealthy climate he returned to his country in the possession of very valuable collections, and published, in 1757, Histoire Naturelle du Sénégal. Some masterly essays of his were printed in the memoirs of the French Academy, and procured him the honour of admission into that distinguished body in 1759. These essays were only preludes to his learned and comprehensive botanical work, Familles des Plantes, two vols. 1763. In this work he attempted, as Ray had done before and Jussieu after him, to introduce a natural system of classification instead of the artificial system of Linnæus. The defect of his classification, according to Jussieu, was that in distinguishing plants by the enumeration of their different characteristics he did not attend to the relative value of the distinctions. He was preparing a new edition, with numerous alterations and important additions, when he formed the plan of publishing a complete encyclopædia of natural science. Hoping to receive support from Louis XV. he began to collect materials, which soon increased to an immense mass; and in 1774 he laid before the Academy a prospectus of a work on so large a scale as to excite general astonishment. The object of the work was to give a methodical description of all known beings in a natural series deduced from the whole of their qualities. The work was of a magnitude somewhat proportioned to the object. It contained a vocabulary with explanations of 200,000 terms. It was carefully examined, but the result did not answer the expectations of the author, who was advised to publish his own investigations and abandon the task of compilation. He rejected this advice and continued to increase his materials with unwearied diligence. Some valuable essays, printed in the Memoirs of the Academy, are all of his writings that subsequently came before the public. The idea of executing his great work continually occupied his mind, and he employed all his means for this purpose. But the revolution reduced him to extreme poverty, and when the National Institute chose him one of its members, he declined their invitation because he had no shoes. A pension was then conferred upon him by the Directory, and was doubled by Napoleon. This he enjoyed till his death in 1806, up to which he was continually employed in preparing his great work. The number of his printed books is small in comparison with the mass of manuscripts which he left.

ADAR, the twelfth month of the Hebrew year; but as the months in the Hebrew calendar are lunar, the time of its commencement reckoned by our calendar varies from 1st February to 3d March. The 14th of Adar is the Jewish feast of Esther. An intercalary month called *Ve Adar*, another Adar, is introduced periodically, to bring the commencement of the lunar year back to the same period of the solar year, the annual difference being about eleven days.

ADDA, a river of Italy, which, descending from the Rhætian Alps, flows along the valley of the Valtelline, and falls into the north part of the Lake of Como. It afterwards issues from its south extremity, flows past Lodi, and joins the Po to the west of Cremona, after a course of about 120 miles.

ADDER, a name often applied to the common viper as well as to other kinds of venomous serpents. See VIPER.

ADDINGTON, HENRY, VISCOUNT SIDMOUTH, was the son of Dr. Anthony Addington, physician to the Earl of Chatham, and thus became intimate in early

life with the younger Pitt. Born in 1757, he was educated at Winchester and afterwards at Brasenose College, Oxford, where he gained the chancellor's prize for an essay on the Affinity between Painting and Writing in point of Composition. He took the degree of B.A. in 1778, afterwards studied law, and was called to the bar. In 1783 he became member of parliament for Devizes, and his friend Pitt, when premier, received from him the warmest support. In 1789 he succeeded Lord Grenville as speaker. This office he retained till 1801, when Pitt left office from a difference with the king on the question of Catholic emancipation. Addington, who was known as one of the king's friends, undertook, at the request of the king, to form a ministry, and became head of the cabinet with the offices of chancellor of the exchequer and first lord of the treasury. He effected the short-lived peace of Amiens. His ministry at first had the support of Pitt, but when the war broke out again in 1803, deeming Addington too weak for the situation, Pitt joined Fox in opposition to him. Addington resigned and Pitt resumed office, abandoning the question of Catholic emancipation. Satisfied with this concession Addington supported the ministry, and in 1805 accepted office as president of the council, being raised at the same time to the peerage by the title of Viscount Sidmouth. Differences with his colleague, however, arose again, and in a very short time he resigned office. After Pitt's death he accepted office as lord privy-seal in 1806, with Fox and Lord Grenville, and soon after resumed the post of president of the council, which he held till the close of Lord Grenville's ministry, and again resumed shortly before the termination of that of Percival (1812). The assassination of the premier led to the formation of Lord Liverpool's government, in which Lord Sidmouth became home secretary. The country was at this time in a very unsettled state, and Lord Sidmouth, though he appears to have conducted himself with great wisdom and moderation, became the object of violent attack, particularly by the radical press, which endeavoured to represent him as the sworn enemy of genuine freedom. He finally retired from official life in 1824, and after attaining the advanced age of eighty-seven, died in 1844. His disinterestedness is admitted even by his enemies, and one marked proof of it was his voluntary resignation of a pension of £3000 eight years before his death.

ADDISON, Joseph, an eminent English essayist, son of the Rev. Lancelot Addison, subsequently dean of Lichfield, was born at his father's rectory, Milston, Wiltshire, 1st May, 1672, passed through the schools of the Rev. Mr. Nash at Amesbury, Wiltshire, and the Rev. Mr. Taylor at Salisbury, and at the age of eleven was sent to the Charterhouse, where he made the acquaintance of his friend and future collaborateur Steele. At the age of fifteen he proceeded to Oxford, entering first at Queen's College, but two years later being elected to Magdalen College, on account, it is said, of his skill in Latin versification. He took the degree of M.A. in 1693, and held a fellowship in his college from 1699 to 1711. He had contemplated entering on the clerical profession, but was diverted from his purpose by his literary tastes and by the early patronage which he received from some of the greatest statesmen of the Whig party. Addison had the good fortune to secure as his earliest patron the poet Dryden. With sympathetic appreciation of Dryden's skill as a translator of classical poetry, the young scholar addressed to him some complimentary verses, which the poet approved of and inserted in his Miscellanies in 1693. A translation of the fourth Georgic, with the exception of the story of Aristæus, by Addison, appeared in the same collection in 1694, and he subsequently translated for it two and a half books of Ovid. A still higher honour was conferred on Addison by Dryden in prefixing his prose essay on Virgil's Georgics to his own translation of that poem, which appeared in 1697. Addison published in 1694 An Account of the Greatest English Poets, a running criticism in verse, which he dedicated to his fellow student, the afterwards celebrated Dr. Sacheverell. It is said to be chiefly notable for the ignorance, common to the day, which it displays of early English poetry. Through the introduction, it appears, of Congreve, Addison early secured an able and powerful patron in Charles Montague, afterwards Earl of Halifax, and in 1695 his own pen secured a greater in Lord Somers. He dedicated to this nobleman, then lord-keeper, a poem on one of King William's campaigns, and received as his reward a pension of £300 to enable him to travel in order to fit himself for the service of the king. In 1699, in which year appeared a collection of his Latin poems in the second volume of the Musarum Anglicanarum Analecta, he left England and after spending more than two years in France and Italy was returning home through Switzerland when he was instructed to repair as envoy to the quarters of Prince Eugene, then engaged in an Italian campaign. The death of King William in March, 1702, cancelled this appointment with the overthrow of his friends. He says, indeed, that he never received more than a single year's payment of his pension, and had to defray the expenses of his travels himself. Nevertheless he was able to extend his tour to Germany and Holland, and returned to England at the close of 1703, having attempted without success to procure an appointment as a travelling tutor. During his residence abroad his pen had not been idle. His tragedy of Cato is supposed to have been written, subject to after revision, during his stay in France. During his journey across Mount Cenis he wrote his Letter from Italy, esteemed the best of his poems, and in Germany his Dialogues on Medals, which was not published till after his death. His Remarks on Several Parts of Italy in the Years 1701–3 was published in 1705. It is an impersonal record of impressions in which current events have hardly any place, the absorbing topic being the correspondences traced between passages in the Latin poets and the scenes it illustrates. It was dedicated to Lord Somers. The first ministry of Queen Anne was a coalition one, in which the Whigs had still considerable power, chiefly due to the victories of Marlborough. Godolphin mentioned to Halifax his desire to have the achievements of the great commanders celebrated in appropriate verse. Halifax strongly recommended Addison, and the commission was at once assigned to him, and he produced the Campaign, which was about as good as a poem made to order by a man of taste and scholarly accomplishments, who was not quite a poet, could be expected to be. Before it was half finished Godolphin's approval was expressed in the form of an appointment to succeed Locke as a commissioner of appeal on excise. One official appointment succeeded another till the fall of the ministry, whose favour he had now made, in 1710. In 1706 he became under-secretary of state to Sir Charles Hodges, next year he accompanied Lord Halifax as his secretary on a mission to the Elector of Hanover. In 1708 he was elected M.P. for Lostwithiel, a seat he exchanged in 1710 for Malmesbury, which place he continued to represent till his death. In 1709 he became secretary to Lord Wharton as Lord-lieutenant of Ireland. It may here be noticed that Addison's temperament, which greatly facilitated his elevation, determined its limit in a political direction. Ex-

tremely shy and even awkward in company, especially among persons of any superiority of pretension, he joined with this diffidence extreme caution of offending and solicitous anxiety to oblige. These qualities, which recommended him to men in office, wholly disqualified him for parliamentary life. He is said to have once attempted to speak in the House; but, if ever he had a higher ambition, he sunk at once and irretrievably into the position of an absolutely silent member. The fall of the ministry in August, 1710, followed by the accession to power of an uncompromising Tory ministry, happened fortunately for Addison's fame. While he was absent in Ireland his old school companion, Steele, had started a paper partly devoted to news but chiefly to essays of a social, moral, and literary character, the Tatler. Addison discovered the author of the enterprise by a literary criticism which he had communicated to his friend, and was readily admitted to share in it. The Tatler was begun 12th April, 1709, and terminated 2nd January, 1711. It was followed on 1st March by the Spectator, which dropped the news section and consisted entirely of essays. It continued till 8th December, 1712. The Guardian succeeded, from 12th March to 1st October, 1713, and the Spectator was resumed from 18th June to 20th December, 1714. The Tatler was published thrice weekly, on Tuesdays, Thursdays, and Saturdays; the Spectator and Guardian every week-day. The bulk of the papers were contributed in nearly equal proportion by Steele and Addison. Addison's contributions to the Spectator are distinguished by one of the initials C., L., I., O. In humorous and satirical character sketches he hardly excelled, perhaps hardly equalled Steele. If more refined he was less direct and pointed. But he was far ahead of his fellow contributor in scholarship and literary taste, and in the breadth and height of his ambition. He poured forth the stores of his knowledge on a greater variety of subjects, and indulged his imagination in more elaborate and artistic creations. But besides these independent efforts of his own he aspired to be a judge and censor of the literary productions of others, and he was, perhaps, beyond any man of his day, well qualified for the task. Certainly his judgments had less force and perhaps less depth than Johnson's, but they had much more of breadth, harmony, and completeness, were woven with more art into a system depending on theoretical principles, and were delivered with a grace and eloquence of which the oracular moralist was no master. If his system was somewhat shallow, it had probably the merit of directing attention more to criticism, and preparing the way for better and more philosophic standards of appreciation. Among the most remarkable of his contributions to the Spectator are his criticism on Milton's Paradise Lost, his essays on the Pleasures of the Imagination, Vision of Mirza, his Saturday essays on moral and religious themes, and his Reflections on the Divine Perfections. Pre-eminent among his character sketches is Sir Roger de Coverley. Steele originated the idea of a Spectator club and sketched the characters of its members. That of Sir Roger was immediately appropriated by Addison, to whom the delicate humour of its subsequent development is exclusively due. The remaining works of Addison not yet mentioned are of comparatively little interest or importance. In opposition to the Examiner, conducted by Swift, he wrote, in the latter part of 1710, five numbers of a Whig Examiner. In 1713 he published, anonymously, The Trial and Conviction of Count Tariff, a libel on the financial policy of the ministry. He had assisted Steele at an early period with his comedy of the Tender Husband, and the drama of The Drummer or the Haunted House was published by Sir Richard Steele after his death and attributed to him. The Freeholder, a political paper in support of the government, published twice weekly from 23rd December, 1715, to 29th June, 1716, was written entirely by him. He also wrote a work on the Evidences of the Christian Religion, and Discourse on Ancient and Modern Learning. Cato was brought on the stage in April, 1713, reluctantly, as is said, and though destitute of dramatic qualities and even deficient in poetry, had a great run of success, which was largely owing to political causes. In August, 1716, he married the Countess-dowager of Warwick. This connection brought him little accession of fortune, as the widow forfeited her jointure by her remarriage. Her haughty demeanour, nevertheless, is said to have made his home unbearable to a man of his nicety of feeling. Whether from this cause, or from the long habit of frequenting taverns, to which he appears at first to have had rather an aversion, he acquired, according to prevalent reports, a habit of excessive wine-bibbing which shortened his days. These latter days were distinguished by a return to political life, and darkened by some painful literary quarrels. On the death of Queen Anne the lords justices who assumed the government appointed Addison their secretary. For a brief period he resumed his former office of secretary to the lord-lieutenant, and in 1715 he was named one of the lords of trade. In 1717 the leading Whigs retired from office, leaving an attenuated party called the German ministry. From this ministry, on 16th April, Addison accepted office as one of the principal secretaries of state. He was probably equally unqualified in point of business capacity and of parliamentary efficiency for this responsible post, and he was probably also sensible of his own incapacity, for it is said that in accepting it he yielded to the ambition of his wife. He retired after eleven months with a salary of £1500. Of his literary quarrels one of the bitterest was with Pope. The cause of it was the publication by Tickell, Addison's secretary, of a part of a rival translation of the Iliad, which Pope suspected was Addison's own, and a remark of Addison's that Tickell's translation was more faithful than Pope's. Pope in revenge wrote the savage satire contained in his lines on Atticus, which he published after Addison's death in his epistle to Dr. Arbuthnot, and which at the time he printed and distributed among his friends. Addison does not appear to have replied publicly, but in the Freeholder he liberally praised Pope's Iliad. Addison had also a quarrel with Gay, and on this occasion he appears to have been in the wrong, as he sent for Gay some time before his death, apologized for having injured him, and promised amends. But the saddest, as it appears to have been the paltriest, quarrel, was with his ancient comrade Steele. The cause of it was political. Steele attacked a bill for the Limitation of the Peerage in the Plebeian. Addison replied in a pamphlet called the Old Whig. Steele answered that Addison was so old a Whig that he had forgotten his principles, and Addison made a contemptuous reply. Addison died of asthma and dropsy at Holland House, on 17th June, 1719. Of his style as a writer so much has been said that nothing remains to say but to quote the dictum of Johnson, 'Whoever wishes to attain an English style, familiar but not coarse, and elegant but not ostentatious, must give his days and nights to the volumes of Addison'. Addison had great conversational powers, and his intimates speak in the strongest terms of the enjoyment derived from his society, but it is acknowledged that he was extremely reserved before strangers. There is a story told of his having sent for his stepson, Lord Warwick, on

his death-bed, and addressed him in these terms, 'See in what peace a Christian can die'. It is alluded to by Tickell, Addison's executor, and is first told circumstantially by Dr. Young, but the truth of the story has been questioned. Addison was buried in Westminster Abbey. He left a daughter born in the year of his death. His works were published by Tickell in four 4to vols. in 1721. An edition, with notes by Bishop Hurd, in six vols. 8vo, was published in 1811. A more complete edition, with Bishop Hurd's notes, was published and edited by H. G. Bohn (in the well-known series, six vols.). A recent edition (in six vols.) is that of Prof. Greene. There have been two recent editions of the Spectator (both in eight vols.) edited respectively by G. A. Aitkin and G. G. Smith. The standard biography is that by Lucy Aikin (1843), which drew from Macaulay an admirable essay.

ADDISON'S DISEASE. See SUPPLEMENT.

ADDRESS, FORMS OF. The following are the principal modes of addressing titled personages or persons holding official rank in Great Britain:—

The King or Queen.—Address in writing: To the King's (or Queen's) most excellent Majesty. Begin: Sire or Madam, or, May it please your Majesty. Refer to as Your Majesty.

The Royal Family.—His Royal Highness (H.R.H.) the Prince of Wales, His Royal Highness the Duke of C—, His Royal Highness Prince A—. A royal duke should be addressed as Sir, not My Lord Duke; and referred to as Your Royal Highness. In the case of a princess address Her Royal Highness the Princess of Wales, Her Royal Highness the Duchess of ——, Her Royal Highness Princess A—; Begin: Madam. Refer to as Your Royal Highness.

The Lord-lieutenant of Ireland is styled His Excellency the Lord-lieutenant, or if a duke, His Grace the Lord-lieutenant. How to begin and refer is determined by his rank in the peerage.

Duke and Ducal Family.—His Grace the Duke of ——. Begin: My Lord Duke, and refer to as Your Grace. Her Grace the Duchess of ——. Begin: Madam, also refer to as Your Grace. The duke's eldest son is in law only an esquire, but in courtesy takes a secondary title of his father, and is addressed as if he held it by right; his wife receives the corresponding title, and their eldest son also takes a courtesy title belonging to the family. A younger son is addressed The Right Honourable Lord J— B—; My Lord, Your Lordship; a daughter, the Right Honourable Lady M— B— (Christian and surname); Madam, Your Ladyship. If married to a commoner or a peer by courtesy the surname is derived from the husband's name or title; if to a peer she takes a title corresponding to her husband's. For Royal Dukes and Duchesses see Royal family above.

Marquis.—The Most Honourable the Marquis of ——. Begin: My Lord Marquis. Refer to as Your Lordship. A marchioness is addressed as The Most Honourable the Marchioness of ——. Begin: Madam, and refer to as Your Ladyship. The family as a duke's.

Earl.—The Right Honourable the Earl of ——, or The Earl of ——. Begin: My Lord, and refer to as Your Lordship. The Right Honourable the Countess of ——; Madam, Your Ladyship. The eldest son is addressed by his courtesy title; younger son: The Honourable A— B— (Christian and surname); the daughter, as a duke's daughter.

Viscount.—The Right Honourable the Lord Viscount ——, or The Right Honourable Lord ——, or the Lord Viscount ——. Begin: My Lord, and refer to as Your Lordship. The Right Honourable the Viscountess ——, or The Viscountess ——, or The Right Honourable Lady ——. Begin: Madam, and refer to as Your Ladyship. The children as those of a baron.

Baron.—The Right Honourable Lord ——, or The Lord ——. Begin: My Lord, and refer to as Your Lordship. The Right Honourable Lady ——, or The Right Honourable the Baroness ——, or The Lady ——; Madam, Your Ladyship. Son: The Honourable J— C—; Sir. A son's wife is The Honourable Mrs. ——, with husband's surname or both Christian and surname; if the daughter of an earl, marquis, or duke, address accordingly. In Scotland a baron's son is addressed as The Honourable the Master of —— (peerage title). Daughter: The Honourable A— B— (Christian and surname); if married, The Honourable Mrs. ——; or The Honourable Lady ——, if her husband is a knight or baronet. Begin: Madam, and refer to as Your Ladyship if so entitled by marriage. If her husband be of higher rank, her title, &c., corresponds.

Baronet.—Sir A— B—, Baronet or Bart. Begin: Sir. A baronet's wife is addressed as Lady with husband's surname (if the daughter of a duke, marquis, or earl, her Christian name is also used, and she is Right Honourable); begin: Madam, and refer to as Your Ladyship. The Christian name of a baronet *must* be used.

Knight.—Sir C— D—, Kt. or K.G., K.C.B., K.G.C.B., &c., according to rank; begin: Sir. In the case of Knights bachelors the Kt. is usually omitted. The wife of a knight of any class is addressed like that of a baronet.

Archbishop.—His Grace the Lord Archbishop of ——. Begin: My Lord Archbishop, and refer to as Your Grace. The Archbishop of Canterbury is most formally addressed as The Most Reverend Father in God, James (or otherwise), by Divine Providence Lord Archbishop of Canterbury, Primate of all England and Metropolitan; the Archbishop of York as The Most Reverend Father in God, ——, by Divine Permission Lord Archbishop of York, Primate of England and Metropolitan. Irish Archbishops are now addressed as The Most Reverend the Archbishop of ——. If an archbishop have a claim to the title Right Honourable he may be addressed as The Right Honourable and Most Reverend. The common American form is The Most Reverend A— B—, D.D.

Bishop.—The Right Rev. the Lord Bishop of ——, or The Right Rev. A— B—, Lord Bishop of ——, or The Lord Bishop of ——. Begin: My Lord Bishop, refer to as Your Lordship. More formally bishops are addressed thus: The Right Rev. Father in God, John, by Divine Permission, Lord Bishop of ——. A bishop suffragan is The Right Rev. the Bishop Suffragan of ——; begin: Right Rev. Sir. In Ireland the Protestant bishops are addressed as The Right Rev. the Bishop of —— (Most Rev. in case of Meath); begin: Right Rev. Sir. In Scotland, The Right Rev. the Bishop of ——; or The Right Rev. A— B—, Bishop of ——; or The Right Rev. Bishop —— (with surname). The Primus of the Scottish Episcopal Church is addressed as The Most Rev.; Most Rev. Sir. Roman Catholic bishops in Ireland are Most Rev. Retired bishops are still Right Rev. In America the form is The Right Rev. A— B—. The wives and children of prelates have no special title as such.

The Lord Mayors of London, York, Dublin, and a few other places, and the Lord Provost of Edinburgh, are styled Right Honourable; the Lord Provost of Glasgow, Honourable. Begin: My Lord, refer to as Your Lordship. A Mayor is addressed (formally) as Right Worshipful; Sir, Your Worship. Lords of Session have the courtesy title of Lord prefixed to their name, and are addressed as My Lord, Your Lordship. Sheriffs and their substitutes are addressed in their courts in Scotland as My Lord.

Members and ex-members of cabinet and all Privy Councillors are called Right Honourable; members of the Senate of the United States and of executive or legislative councils in the British colonies, Honourable.

ADEL, or ADAL, a part of Eastern Africa, lying between Abyssinia and the Gulf of Aden. It is in general naked and barren, with occasional patches of good soil and also tracts covered with grass. It is under French influence, the French possessing the territory of Obok here. The people, also called Adel, belong to the Afar or Danâkil stock of Hamites, and are a tall, warlike race of fine physique.

ADELAIDE, the capital of South Australia, an episcopal city situated about 6 miles east from St. Vincent Gulf, its shipping port being Port Adelaide, with which it is united by railway. Adelaide was founded in 1837, and named after the queen of William IV. Situated on a large plain inclosed on the south and east by the Mount Lofty Mountains it is regularly built, with the streets at right angles, and is divided into two chief sections, North and South Adelaide, separated by the Park Lands and the river Torrens, which is crossed by six iron bridges. The river has been dammed up and converted into a fine sheet of water, forming both an ornament and

source of recreation, with park grounds and promenades on either side. South Adelaide is laid out almost in the form of a square, and is surrounded by four terraces facing the cardinal points, and named North, South, East, and West Terraces. There are numerous squares and open spaces in North and South Adelaide. The principal street, running north and south through Victoria Square in South Adelaide, is King William Street. The public buildings comprise the Government House, the town-hall, the post and telegraph office, the government offices, courthouses, the houses of legislature (the western wing of which has been built at a cost of £100,000), the University, South Australian Institute, with a museum and library of 25,000 volumes, the hospital, the building erected for the exhibition of 1887, St. Peter's Cathedral, the Roman Catholic Cathedral, and numerous churches. Among other buildings may be mentioned the royal exchange, the building of the Young Men's Christian Association, St. Peter's and Prince Alfred Colleges, several of the banks, insurance offices, and other business premises. There are two lunatic asylums and other charitable institutions. The botanic gardens, extending from the east of North Terrace to the river, occupy an area of 40 acres. A complete service of tramway cars gives communication between the various parts of the town and the various suburbs and residential quarters. Adelaide has direct railway communication with Melbourne, and the mails from Europe by the P. and O. and Orient lines are landed here. Pop. (excluding suburbs) in 1891, 37,837; in 1901, 38,981.

ADELSBERG, a small town of Austria-Hungary, in Carniola, among limestone hills, in a lofty and barren district, on the road from Vienna to Trieste, remarkable for the stalactital caves in its vicinity. The principal one, in the mouth of which the Poik disappears in a vast chasm, extends to the distance of 2 or 3 miles, and is found to terminate in a lake. After proceeding 200 yards into it a vast gloomy space, called the Dome, forming a hall 300 feet long by 100 feet high, is entered. The river is heard rushing below, and on crossing it by a wooden bridge and ascending a flight of steps cut in the rock, a series of lofty halls, supported by gigantic concretions resembling lofty Gothic columns, and apparently filled with statues of exquisite whiteness and delicacy, meets the view. (See PROTEUS.)

ADELUNG, JOHANN CHRISTOPH, a German scholar, was born August 8, 1732, at Spantekow, in Pomerania, where his father was a clergyman. He finished his education at Halle, and in 1759 he was appointed professor in the Protestant academy at Erfurt, but two years after ecclesiastical disputes caused him to remove to Leipzig, where he applied himself to his great works on the German language and literature, particularly his Dictionary or Grammatisch-kritisches Wörterbuch der Hochdeutschen Mundart (Leipzig, 1774–86). In 1787 he became librarian of the public library in Dresden, an office which he held till his death, September 10, 1806. Of his other works we may mention his Mithridates oder allgemeine Sprachenkunde, a general work on philology of which he finished only the first volume; the three others being by Vater, of Halle.

ADEN, a town and small territory belonging to Britain near the south-west angle of Arabia, about 100 miles east from the Strait of Bab-el-Mandeb. The town is partly situated in the crater of an extinct volcano, and almost entirely closed in by an amphitheatre of dark rocks, which give it a wild and sombre aspect. It is a free port and possesses an admirable harbour, consisting of the western bay or outer harbour and the eastern bay or inner harbour, formed respectively on the west and north of the peninsula on which it stands. Aden is an imperial coaling-station, is strongly fortified and permanently garrisoned, and is now an important emporium of commerce. Many steamers call, but the direct trade between Britain and Aden is small. Coffee of the best quality, and all the other commodities which enter into the commerce of this region, are procured here, including the gums, myrrh, frankincense, and balsams imported from the north-eastern districts of Africa. A considerable trade is carried on with the interior, from which the supplies of fresh provisions are brought. The trade has received a great impulse from the opening of the Suez Canal. The station is thus important to Britain both in a commercial and political point of view. The peninsula of Aden somewhat resembles the rock of Gibraltar, and could be rendered as formidable. For its water supply it depends on wells, reservoirs, and condensers. Aden was a Roman colony and a celebrated fortress in the time of Constantine. In the middle ages it was the entrepôt of the eastern trade, and retained its importance till the discovery of the Cape route to India. In 1839 the town, and the peninsula on which it stands, were purchased by the East India Company from the sheikh to whom they belonged, to be made a depôt for coals and a calling-station for the mail steamers between India and Suez. The son of the sheikh refusing to deliver it up, a naval and military force sent out in 1839 took possession of it. The place was afterwards attacked repeatedly by the Arabs. The area of the territory is about 75 square miles. It is politically a part of the Bombay Presidency. The small island of Perim is attached to Aden, and an area of 9000 sq. miles of Arabia forms a protectorate. Pop. of Aden proper with Perim (1901), 43,974.

ADENOIDS (Greek *adēn*, a gland), the name for certain small rounded gland-like bodies or growths that often appear in the back part of the pharynx or throat, above the level of the mouth, in children, forming an obstruction that may make breathing through the nose impossible. This causes the child to keep the mouth always open and to snore badly in sleep. The growths also block the tubes passing from the throat to the ear, and thus cause deafness; while the child has usually an unintelligent, dull expression. Such growths can be removed by a simple surgical operation.

ADERNO (anciently *Adranum*), a thriving town of Sicily, in the province of Catania, 18 miles north-west of the town of that name, and about 10 miles W.S.W. of Mount Etna. It has an old quadrangular Norman castle, now used as a prison. Pop. (1901), 25,859.

ADHESION, in physics, denotes the tendency of two bodies to stick together when put in close contact, or the mutual attraction of their surfaces; while *cohesion* denotes the mutual attraction between the particles of a homogeneous body. Adhesion may exist between two solids, between a solid and a fluid, or between two fluids. A considerable force is required, for instance, to separate two plates of glass or two polished metallic surfaces. A plate of glass or of polished metal laid on the surface of water, and attached to one arm of a balance, will support much more than its own weight in the opposite scale, from the force of adhesion between the water and the plate. It is adhesion that causes a body dipped in water to come out wet. There are many apparent exceptions to the universality of this force, but they may be explained by the counter action of more powerful forces. The particles of mercury, for example, adhere to gold, silver, or lead, but not to glass. They are acted on by two forces: their own cohesion and the adhesive force exercised by the

surface of the body in contact. To it, therefore, they do or do not adhere, according as the second force is stronger or weaker than the first.

ADIGE, or ETSCH (ancient *Athesis*), a river of Northern Italy, which rises in the Rhætian Alps, and after a south-west and then south-east course of about 180 miles, during which it passes Verona and Legnago, falls into the Adriatic south of Chioggia. A naturally formed and partly canalized channel connects its lower course with the Po near its mouth. Its course, between high banks, often artificial, is rapid, and its navigation, extending to Verona, is difficult, especially in spring, when the melting snows often produce sudden floods.

ADIPOCERE (from *adeps*, fat, and *cera*, wax), a substance of a light-brown colour, formed by animal matter when kept under water or in a moist place, away from the air. It was discovered by Fourcroy on the removal of the Cimetière des Innocents in Paris in 1787; the bodies of the poor there interred had been piled above one another, and were converted into a soft, cheese-like mass. This substance consists mainly of a mixture of fatty acids, but small quantities of ammonia, and of potassium and calcium, are present.

ADIPOSE TISSUE, the cellular tissue containing the oily or fatty matter of the body.

ADJECTIVE, the name given by grammarians to one of the parts of speech, the effect of which is to define the noun or substantive to which it is an accessory in respect of quality, number, magnitude, or position. This characteristic is expressed in the etymology of the term—something *added* or *appended*. The effect of an adjective is also to limit the comprehensiveness of the term to which it is prefixed, as when we say a *Gothic building*, a *warm climate*, we exclude respectively from these all buildings that are not Gothic, and all climates that are not warm. The adjective is indeclinable in English, but in many languages it follows the inflections of the substantive. A substantive is frequently used as an adjective, as in the expressions *silver cup*, *Turkey carpet*, *window curtain*, &c.

ADJUDICATION, in English law, is the decree of the court in bankruptcy declaring a person bankrupt. (See BANKRUPT.) In Scotland it is a proceeding for attaching real estate for debt.

ADJUSTMENT, in marine insurance, is the settling of the amount of the loss which the insurer is entitled under a particular policy to recover, and if the policy is subscribed by more than one underwriter, of the amounts which the underwriters respectively are liable to pay. The endorsement of an adjustment on a policy, signed or initialed by the underwriter, is sufficient as *prima facie* evidence to establish a debt. It is not universally held to preclude the underwriter from afterwards disputing the claim, but except on the ground of fraud it would establish a strong presumption against him in the event of his doing so.

ADJUTANT, an officer whose duty is to assist the commander of a body of troops. The officer in command of a regiment has generally one adjutant; the chiefs of brigades, divisions, or corps d'armée have one or more as they may require. The adjutant has to make known the orders of his chief, to receive reports intended for him, to see that proper discipline is kept up, to regulate the rotation of duty among the different portions of the body of troops with which he is connected, and generally to superintend their internal economy. The *Adjutant-general* in Britain is one of the chief staff-officers of the army, and is a member of the army council, which includes also the chief of the general staff as first military member of the council, the quarter-master-general, and the master-general of ordnance, besides the secretary of state for war as *ex-officio* member, parliamentary under-secretary, financial secretary, and permanent secretary. He is responsible for the organization of the army, for discipline, training, education, recruiting, &c. The army medical service belongs to his department.

ADJUTANT-BIRD, a large Grallatorial or Wading bird of Asia belonging to the genus *Leptoptilos* and the stork family. It is known in India as Hurgila or Argala, whence its scientific name *L. argala*. The adjutant was the first of birds to attract the attention of Bishop Heber on his landing at Calcutta. 'In the morning, as the day broke,' he wrote, 'we were much struck by the singular spectacle before us. Besides the usual apparatus of a place of arms, the walks, roofs, and ramparts of the fort swarmed with gigantic birds, the Hurgila, larger than the largest turkey, and twice as tall as the heron, which in some respects they much resemble, except that they have a large blue and red pouch under the lower bill. . . . These birds share with the jackals, who enter the fort through the drains, the post of scavenger; but unlike them, instead of shunning mankind day and night, they lounge about with perfect fearlessness all day long, and almost jostled us from our paths.' The bag or pouch under the bill is unconnected with the gullet, but is capable of being inflated at will. Its use has not yet been ascertained. The bird is described as being an omnivorous glutton, to whose all-digesting stomach nothing comes amiss. A leg of mutton and a litter of live kittens swallowed whole, with some earth and bones between them, by way of stimulating digestion, have been observed to be consumed by the adjutant at a single meal. It is a summer resident in India, and is most common in Bengal, breeding farther to the south-east. The colour is gray above and white beneath. The beak is extremely long and powerful; and the head and neck are almost naked. From underneath the tail are obtained those light downy feathers which are known as *marabou* feathers, from the name of an allied species of bird (*L. marabou*) inhabiting Western Africa, and also producing them. The adjutant stands about 5 feet high. The African species is quite similar to the Asiatic in its habits and general appearance. It is of a greenish slate-colour above, the rest of the plumage being white.

ADMETUS, in Greek mythology, a king of Pheræ in Thessaly. He took part in the Calydonian chase, and in the expedition of the Argonauts. When Apollo was compelled to serve a mortal for having slain the Cyclops, he tended the flocks of Admetus for nine years. The king sued for Alcestis, daughter of Pelias, who promised her on condition that Admetus should come in a chariot drawn by lions and boars. This the king was enabled to do, having the assistance of Apollo. Alcestis gave signal proof of her attachment by consenting to die in order to prolong her husband's life. (See ALCESTIS.)

ADMINISTRATION, in politics, in its widest sense, means the executive part of government, or those persons who are intrusted with the execution of laws and the superintendence of public affairs. In England the term is commonly used as equivalent to the ministry or cabinet.

ADMINISTRATOR, in English law, the person to whom the goods of a man dying intestate are committed by the proper authority, and who is bound to account when thereunto required. For matters relating to this title see EXECUTOR. By the law of Scotland the father is what is called administrator-in-law for his children, and his power extends over whatever estate may descend to them unless that estate has been placed by the donor under the man-

agement of trustees. This power ceases whenever the child ceases to live with the father, unless he continues to live at the father's expense. The power in the case of daughters ceases on their marriage, the husband being the legal curator of his wife.

ADMIRAL, the commander-in-chief of a squadron or fleet of ships of war, or of the entire naval force of a country, or simply a naval officer of the highest rank. Probably this word is of Arabic origin, from *amir*, a chief or prince, as in *amir-al-omra*, commander of the forces. In the time of the Crusades the office and name were introduced into Europe. The first authentic instance that occurs of admirals in Europe is about 1284, when Philip, king of France, created Enguerrand de Coucy admiral of his fleet. In the reign of Edward I., king of England, we find a title of honour 'Admiral de la mer du roy d'Angleterre,' conferred for the first time on William de Leybourne; and about this time the jurisdiction of the English seas was committed to three or four admirals, who held the office *durante bene placito*. From the time of Edward II. a regular succession of admirals is to be traced; and in the thirty-fourth year of Edward III. John de Beauchamp, lord-warden of the Cinque Ports, was created High-admiral of England. The office underwent several changes, and persons of high rank, some of whom were entirely unacquainted with naval affairs, continued to fill this office until 1632, when it was first put into commission, as it remained during the protectorate of Cromwell. James, duke of York, afterwards James II., exercised the functions of lord high-admiral for several years of Charles II.'s reign. Many of his regulations are observed to the present time, and evince his zeal for this most important service in England. During the reign of William and Mary the powers of the lord high-admiral were committed to lords commissioners of the admiralty. Prince George of Denmark enjoyed this dignity during a short period of the reign of Anne; since which time it has always been vested in lords commissioners, acting under the statute of William and Mary, till the year 1827, when Canning, the premier, prevailed on the Duke of Clarence, afterwards William IV., to accept the office of lord high-admiral; but the duke, soon after the formation of the Duke of Wellington's administration, gave up the office. There are at present six lords commissioners, of whom the first lord is always a member of the cabinet. His official income is £4500 per annum. The others are the first, second, third, and fourth naval or sea lords, with a salary of £1500; the sixth being the civil lord, salary £1000.—*Admiral of the Fleet* is an honorary distinction bestowed upon a few admirals, and having an increase of pay attached to it.—The powers of the Lord High-admiral of Scotland have been vested since the Union in the admiralty of Great Britain, which appointed a judge or vice-admiral, who executed its duties till they merged in those of the Court of Session. Admirals, being commanders-in-chief of any fleet or squadron, carry their flags at the main-top-gallant-mast head. Up to 1864 they were designated as admirals of the Red, White, or Blue, according to the colour of their flag; but these distinctions no longer exist. (See UNION FLAG.) They rank with field-marshals in the army. The vice-admiral carries his flag at the fore-top-mast head, and takes rank with the lieutenant-generals of the army. The rear-admiral carries his flag at the mizzen-top-mast head, and ranks with major-generals. The rates of pay of flag-officers in the British navy are:—Admiral of the fleet, £6 per day; admiral, £5; vice-admiral, £4; rear-admiral, £3. An admiral commanding-in-chief has £3 additional at home, and £4, 10*s.* abroad per day, as table money, when his flag is flying within the limits of his station. The number of flag-officers on the active list in 1910 was—admirals of the fleet, 5; admirals, 12; vice-admirals, 21; rear-admirals, 55.—In France the admiral (*l'amiral*) enjoyed until 1627 very great prerogatives; but Richelieu, deeming the influence of the office too great, abolished it. Louis XIV. re-established it in 1669 with less power. In the revolution this office of course vanished with the abolition of the monarchy. Napoleon renewed the office, and invested his brother-in-law Murat with it. The Duke of Angoulême was the first admiral after the restoration of the Bourbons. The highest officers in the French navy have only the title vice-admiral; after these follow the rear-admirals (*contre-amiraux*).

ADMIRALTY CHARTS are charts issued by the hydrographic department of the admiralty; they are prepared by specially appointed surveyors and draughtsmen, and besides being supplied to every ship in her majesty's fleet, are sold to the general public at prices ranging from 10*s.* to 6*d.*, which is much less than their cost, the object being to insure a wide use of them. They are divided into the following sections: 1, the English and Irish Channels, and the coasts of the United Kingdom; 2, the North Sea and adjacent coasts; 3, the Baltic; 4, the north and west coasts of France, Spain, and Portugal; 5, the Mediterranean, the Black Sea, and Sea of Azov; 6, the Atlantic and islands; 7, the Arctic Sea and the north and east coasts of America; 8, the West Indies, Gulf of Mexico, &c.; 9, the east coast of South America; 10, the west coasts of North and South America; 11, Africa, Madagascar, Mauritius, Red Sea, &c.; 12, the East Indies, Arabian coast, &c.; 13, the Indian Archipelago, China Sea, Japan, &c.; 14, Australia, New Zealand, &c.; 15, the islands of the Pacific. In connection with these charts there are published books of sailing directions, tables, and lists of lights. The navigating charts are generally on the scale of half an inch to a mile, and show all the dangers of the coasts with sufficient distinctness to enable the seaman to avoid them; the charts of larger size exhibit all the intricacies of the coast.

ADMIRALTY COURT. The Admiralty Court of England, as originally constituted, had cognizance of civil and criminal causes of a maritime nature, including captures in war made on the high seas, and likewise offences committed, and many contracts made thereon. The admiralty jurisdiction was formerly divided between the instance and the prize courts, the former being the ordinary admiralty court, and the latter constituted by a special commission in time of war, to take cognizance of prizes, though the presiding judge of the court was the same in both cases. By 4 and 5 William V. cap. xxxvi. and 7 and 8 Victoria, cap. ii., the admiralty court lost its criminal jurisdiction, and the prize court was virtually abolished by 3 and 4 Victoria, cap. lxv. The instance court extended generally to all marine contracts, that is, such contracts as are made upon the sea, and are founded in maritime service or consideration; regulated disputes between part owners of vessels; questions relating to salvage, collisions, suits for pilotage, &c. It has now been merged in the Supreme Court of Judicature (which see). Maritime offences, such as piracy, are now tried by the courts of assize, or at the Central Criminal Court.

ADMIRALTY DROITS form a portion of the ancient hereditary revenues of the crown, and arise chiefly from enemies' ships and goods detained previously to the declaration of war, or coming into port by stress of weather, mistake, or in ignorance of the outbreak of hostilities, or from such ships as are taken by non-commissioned captors; from all goods picked

up at sea, the proceeds of wrecks, and the goods of pirates. These droits originally appertained to the office of the lord high-admiral, but were surrendered by Prince George of Denmark when he held that office, and they are now applied to public purposes.

ADMIRALTY ISLANDS, a cluster of islands belonging to Germany, thirty or forty in number, north of New Guinea, in what is now called Bismarck Archipelago. The largest is about 50 miles in length; the rest are much smaller. They are covered with a luxuriant vegetation, and possess dense groves of cocoa-nut trees. The Dutch discovered them in 1616. The islanders are of a tawny colour, tall, and almost in a state of nudity.

ADOLPHUS OF NASSAU was elected Emperor of Germany, May 1, 1292, and crowned at Aix-la-Chapelle, June 25. He was of an illustrious family, and of approved courage, but destitute of those great qualities which had raised his predecessor, Rodolph of Hapsburg, to the throne. He owed his election in part to his intrigues with the electors of Cologne and Mainz, who imposed on him the hardest conditions, and forced him to resign to them cities and territories which were not his own. But refusing to fulfil when emperor what he had promised when count, he soon saw himself hated and deserted by his friends. Urged by want of money, he received £100,000 sterling from Edward I. of England, and in return engaged to assist him against Philip the Fair of France; but he was by no means sorry to see the pope forbid his participation in the war. In this way he made himself contemptible in the eyes of the German princes, and became still more odious to them by taking advantage of the hatred of Albert, landgrave of Thuringia, against his sons, and purchasing this territory from him. This purchase involved him in a five years' war, in which he attempted unsuccessfully to subjugate the country which he had bought. Disgusted at such disgraceful conduct, and urged on by Albert of Austria, the college of electors, excepting those of Treves, Cologne, and the Palatinate, cited Adolphus to appear before it. Failing to appear, the throne was declared vacant, June 23, 1298, and Albert of Austria elected. A war already existed between the two rivals, in which Adolphus seemed superior, until, deceived by the manœuvres of his foe, he found himself surrounded at Gellheim, and fell, after a heroic resistance, by Albert's own hand, July 2, 1298.

ADONAI. See JEHOVAH.

ADONIS, a mythological personage said to have been the son of Theias, king of Assyria, and his daughter Smyrna (Myrrha). Aphroditē (Venus) took charge of him when quite an infant; but having intrusted him to the keeping of Persephonē (Proserpine) the latter refused to give him up again. The dispute which arose for possession was decided by the declaration of Zeus that Adonis should spend four months of the year with Aphroditē, four with Persephonē, and the remaining four where he himself pleased. Adonis preferred the company of Aphroditē and spent the months at his own disposal with her. She accompanied him to the chase, pointing out the dangers to which he was exposed. Adonis, disregarding her advice, eagerly pursued the wild beasts of the forest, but happening to fail in an attack upon a wild boar, he was mortally wounded by this ferocious animal. The goddess, hearing of his misfortune, hurried to his assistance, and in her haste her foot was wounded by a rose-bush, the flowers of which, formerly white, from that time took the colour of blood. When she reached the spot she found him lifeless on the grass, and, to alleviate her grief and preserve his memory, she transformed him into the anemone. The worship of Adonis arose in Phœnicia, and latterly was widely spread round the Mediterranean. See TAMMUZ.

ADOPTIANI, a religious sect which asserted that Christ, as to his divine nature, was properly the Son of God; but as to his human nature, only such by adoption, by baptism and regeneration, through which God's mercy adopts other men also as his children; for they thought it impossible that a human being could be called the *Son of God* in a literal sense. Elipandus, archbishop of Toledo, and Felix, bishop of Urgel, in Spain, avowed this doctrine in 783, and made proselytes both in Spain and France. Charlemagne condemned their heresy at the Council of Ratisbon, and dismissed Felix from his office. This sentence was repeated three times: at Frankfort, 794, at Rome and at Aix-la-Chapelle in 799, because the bishop relapsed twice into his former error. He was then placed for the remainder of his life under the care of the Bishop of Lyons. Elipandus stoutly maintained the doctrine till his death; and it has been since defended by Duns Scotus, the Jesuit Vasquez, and the Protestant Calixtus.

ADOPTION, the admission of a stranger by birth to the privileges of a child. Cases of adoption were very frequent in Greece and Rome, and the custom was regulated by clearly defined laws. In Athens a man might adopt a son either in his lifetime or by will, provided he was sane and had no male issue. Only Athenian citizens could be adopted; but females could be adopted as well as males. The adopted child was transferred from his own family and demus into those of his adoptive father, whose property he inherited and whose religious duties he discharged. It was not necessary that he should take his new father's name; but he had to be registered in the adoptive father's gens, otherwise he did not possess the rights of citizenship as a member of his new demus. In Rome adoption was effected under the authority of a magistrate, or if in the provinces under that of the governor. The person to be adopted was emancipated by his natural father before the competent authority (see EMANCIPATION), and surrendered to the adopter by a legal form. When the person was not in the power of his parent the ceremony was called adrogation or arrogation, and originally required the vote of the people in the comitia curiata; but under the emperors it was effected by an imperial rescript. The effect of adoption was to create the legal relation of father and son, just as if the person adopted was born of the blood of the adopter in lawful marriage. The adopted son took the name of his adopter, and was bound to perform his new father's religious duties. The adopter could not adopt unless he had no children, nor any reasonable chance of having any. Persons who could not in the natural course of events have children, such as eunuchs, were excluded from the privilege of adoption. The adopter was required to be at least eighteen years older than the person to be adopted. Guardians were not permitted to adopt their wards, nor a poor man a rich child. Females could not be adrogated, nor could they adopt, but might under certain conditions secure to any child the right of support and inheritance. The motive to the act was frequently a political one; thus Clodius, the enemy of Cicero, was adrogated that he might be eligible as a tribune of the people. Adoption is not recognized by the law of Scotland and England; but there are legal means which enable one to assume the name and arms, and to inherit the property of another. In Germany the rules respecting adoption are derived from the civil law, but require the sanction either of the sovereign or of the judiciary. The adopted child receives the name of its adopter, but does not share in his rank if he be a nobleman, except by the special

permission of the sovereign. In Prussia an adopted child has all the rights of an actual child as against his adoptive father, but not *vice versa*; so that the person adopting can make no claim on the property of the adopted. Only persons of the age of fifty years can adopt, and adoption must be by written deed and sanctioned by a court of law. A married couple must have lived many years without children before they are allowed to adopt a child. The modern French law also admits adoption, but only on certain conditions. Those who wish to adopt must have supported the person to be adopted for six years while under age, or the adopter's life must have been saved by the person to be adopted. Excepting in this last case, the latter must be as much as fifteen years younger than the former. Adoption (excepting as before) cannot take place until the person to be adopted is of age, and must be ratified by the district court as well as by the court of appeal.

ADOUR, a river of southern France, having its source in the mountain ridge of the Tourmalet, in the department of Hautes-Pyrénées. Its course is first north, then west and south-west and south-south-west, passing St. Séver and Dax, to the former of which it is navigable, and it falls into the sea a little below Bayonne. Its whole length is estimated at about 200 miles. The current is rapid, and sometimes serious inundations are caused by the melting of the snows on the Pyrenees. There is a shifting bar at the river's mouth.

ADOWA, or ADUA, a town of Abyssinia, and the capital of Tigré, stands on the left bank of the river Hassam, a tributary of the Tacazzé, at an elevation of 6000 feet above the sea, about 10 miles east of Axum. It is the chief commercial depôt on the great caravan route from Massowah to Gondar, being at the distance of about 110 miles from the former. Though it still carries on some trade and also has manufactures of cotton cloths, iron, and brass ware, owing to the civil wars which have been so common in Abyssinia it has greatly declined from its former prosperity and now presents rather a miserable appearance. Here, on March 1, 1896, King Menelik completely defeated the Italians under General Baratieri. Pop. 3500.

ADRA (the ancient *Abdera*), a seaport of southern Spain, in the province of Almeria, and 29 miles W.S.W. from the town of that name, near the mouth of the Adra, on an eminence facing the Mediterranean. The inhabitants are employed in agriculture, fishing, distilling brandy, and manufacturing lead from the ore produced from the extensive mines in the neighbourhood. Pop. (1897), 9210.

ADRAMYTI, or EDREMID (the ancient *Adramyttium*), a town in the north-west of Asia Minor, a few miles inland from the head of the gulf of the same name, 80 miles north of Smyrna. It lies on a small fertile plain, and has the slopes of Mount Ida rising on the north. The streets are narrow and ill paved. It has a small port, from which are exported wool, olives, and gall-nuts, chiefly sent to Constantinople. The ancient Adramyttium was a seaport of some note: a ship of Adramyttium is mentioned in the Acts of the Apostles. Pop. estimated at 8000.

ADRASTUS, according to ancient Greek legend a king of Argos, son of Talaus and Eurynomē. In obedience to the oracle which commanded him to give one of his daughters to a lion and the other to a wild boar, he gave Argeia to Polynices, who came to him in a lion's skin, and Deïpylē to Tydeus, who was dressed in the skin of a wild boar. To restore Polynices to his throne he stirred up the war of the seven princes against Thebes, and he himself was the only one who survived the siege. Ten years after this he made a second expedition against Thebes, accompanied by the sons of his former allies, and took the city, but lost his son in the engagement, and died himself of grief. See ETEOCLES AND POLYNICES.

ADRENALIN, an active principle extracted from the adrenals or suprarenal capsules (see article) of cattle and sheep, of recent introduction in medical practice. It possesses strong styptic properties, and is used in minor surgical operations connected with the eye, the nose, and the throat, being employed in the form of spray, and often in combination with a small percentage of cocaine, such operations being thus bloodless and painless. It has also been employed by injection in cases of rickets, and osteo-malacia, or softening of the bones, and in other ailments, including heart failure, being a strong stimulant.

ADRIA, a cathedral city of Northern Italy, in the province of Rovigo, between the Po and the Adige. The present town is comparatively modern; the ancient city stood a little to the south of it, and was at one time a flourishing seaport, giving its name to the Adriatic, from which Adria is now 13 miles distant; the alluvial deposits of the Po, the Adige, and other smaller rivers having gradually filled up its harbour, and, in the course of ages, formed the tract of land which now intervenes between it and the sea. Pop. (1901), 15,678.

ADRIAN, a town of the United States, in Michigan, on Raisin River, 74 miles W.S.W. of Detroit, the centre of trade for a fine farming region. It has a Methodist college, handsome schools, masonic temple, &c. Its various industries include in particular that of wire-work. Pop. (1900), 9654.

ADRIAN, or HADRIAN, PUBLIUS AELIUS HADRIANUS, a Roman emperor, the successor of Trajan, was born at Rome, A.D. 76. Adrian lost his father, a Roman senator, at the age of ten, was partly brought up by his relation, Ulpius Trajanus (afterwards the Emperor Trajan), and entered the army at the age of fifteen, serving as military tribune in Lower Mœsia about the year 95 A.D. After Trajan assumed the purple Adrian married Julia Sabina, a granddaughter of Marciana, the emperor's sister. From this time the most important offices were conferred upon him; he was successively quæstor (101), prætor (107), and consul (109). He accompanied the emperor in his expeditions against the Dacians (101–103 and 104–106), and gained great distinction for his bravery in the last campaign, which ended in Dacia becoming a Roman province. He subsequently held a high military command under the emperor in the Parthian war, and when Trajan's serious illness compelled him to return to Italy Adrian was made commander-in-chief and governor of Syria. On the death of Trajan in Cilicia in 117 Adrian was proclaimed emperor by the Syrian legions, and the senate ratified the election. He is said by some to have owed his elevation to Plotina, who concealed the death of her husband until she had time to forge a testament bearing the name of the late emperor in which he was made to adopt Adrian, and until she had bribed the troops to espouse her favourite's cause. The state of the empire at this juncture was critical; insurrections had broken out in Syria, Palestine, and Egypt; Mœsia in the east and Mauritania in the west were being overrun by barbarian hordes; while the Parthians once more threw off the Roman yoke, and inflicted severe defeats on some of the imperial legions. Adrian's first care was to conclude a peace with the Parthians, by surrendering to them all Trajan's conquests beyond the Euphrates. He returned to Rome in 118, but almost immediately afterwards departed for Mœsia, which was suffering from the inroads of the Sarmatians and Roxolani.

These barbarians he succeeded in bribing off, probably at the expense of an enormous sum. He discovered, or pretended to discover, about this time a formidable conspiracy against his life by several of the most distinguished of the Roman nobles, and caused all of them to be put to death. He then returned to Rome, and tried to acquire popularity by gladiatorial spectacles, large donations of corn and money to the people, and the remission of the arrears of state taxes due for the last fifteen years. From 119 to 126 or 127 he made his famous journey on foot, and with his head uncovered, through all the provinces of his empire. Among other places he visited Britain, and caused a wall to be built from the mouth of the Tyne to the Solway Firth, to secure the Roman provinces from the incursions of the Caledonians. (See ADRIAN'S WALL.) In 129 he set out by way of Athens on his second journey to the East, returning from Egypt through Syria to Rome in 131. In Egypt he lost his favourite Antinoüs, whose death he lamented long and bitterly, and in whose honour he founded a city and temple, and executed some works of art, and whom he enrolled among the gods. Not long after Adrian's return the Jewish war broke out, in consequence of his having established a Roman colony on the site of Jerusalem, and forbidden the Jews to practise circumcision. This war was carried on by the Jews with the most desperate fury, and did not terminate till 136, when the country was reduced almost to a wilderness. In 132 Adrian went again to Athens, his favourite city, and remained there during the following year. During the latter years of his life his health failed, and he became peevish, suspicious, and cruel, putting to death several persons of worth and distinction. These years were spent partly in Rome, partly in his villa at Tibur. Being childless he adopted as his successor Lucius Aelius Verus, a sensual young man, only noted for his physical beauty, who died, however, before his patron. Adrian now chose a more worthy successor in the person of Antoninus Pius, who succeeded him on his death, which occurred at Baiæ in July, 138. Under his reign the empire flourished in prosperity, and in comparative peace. He, himself no mean scholar, encouraged literature and the arts, reformed the laws, and asserted military discipline. His vast and active genius was equally suited to the most enlarged views and to the minute details of civil policy. To him is attributed more than to any other the consolidation of the monarchical system of Rome. He divided Italy into four districts, each governed by a consul, to whom was intrusted the administration of justice. He founded several cities, among others Adrianopolis; erected numerous magnificent edifices, of which we can only mention the villa of Tibur, which has been a mine of art treasures; and the mausoleum at Rome, which forms the groundwork of the Castle of St. Angelo. He wrote several books; among others, a history of his own life, under the name of Phlegon, one of his freedmen, which is no longer extant. He composed, not long before he breathed his last, the following lines:—

> Animula, vagula, blandula,
> Hospes comesque corporis,
> Quæ nunc abibis in loca,
> Pallidula, rigida, nudula,
> Nec, ut soles, dabis jocos,

which have tested the powers of Prior, Pope, Byron, and many others as translators.

ADRIAN. There have been six popes of this name. The first, a Roman, ruled from 772–795, was a contemporary and friend of Charlemagne, who, on account of Adrian's able defence of his claims to the crown of France, protected him with his army (774) against Desiderius, king of the Lombards, confirmed the donation of Pepin to the territory of the church, and made further grants himself. The pope was not allowed, however, to enjoy in peace the gifts of Charlemagne till 787, after the termination of the frequent campaigns of this king against the Italian princes who claimed the territory. By approving the decrees of the Council of Nice (786) in favour of the veneration of images, Adrian gave offence to Charlemagne, who was opposed to the practice, and procured a repeal of the decree at the Council of Frankfort. This appeal was resisted by Adrian; but he so carefully and skilfully avoided offending the king that the latter remained his friend, and honoured him after his death (795) with an inscription, yet preserved in the Vatican. Though by no means a profound theologian, Adrian obtained great influence by the correctness of his conduct and his decision of character. By a prudent use of this influence he greatly increased his power. He expended vast sums in rebuilding the walls and restoring the aqueducts of Rome.—ADRIAN II., a Roman, was elected pope in 867, at the age of seventy-five years. He was esteemed for his virtues, and famous on account of his bold opposition to the divorce of Lothaire, king of Lotharingia, from his wife Thietberga. By interfering in the dispute which arose after the death of Lothaire, between Charles the Bald and the Emperor Louis, respecting the right of succession, he made the former his enemy. He had another dispute in France, where Bishop Hincmar of Laon had been dismissed against his will; he likewise excommunicated the patriarch Photius of Constantinople for exercising spiritual jurisdiction over Bulgaria, which diminished the authority of the pope, since the Greek Church maintained its independence against him, and made Bulgaria dependent on itself. He died in 872, in the midst of his conflicts with this church.—ADRIAN III., a Roman, elected 884, was pope for one year and four months only. He was opposed to the influence of the emperors on the election of the pope, and was the first pope that changed his name on the occasion of his exaltation.—ADRIAN IV., an Englishman, originally named *Nicolas Breakspear*, rose, by his great talents, from the situation of a poor monk to the rank of cardinal and legate in the North, where he established, at Drontheim, the first Norwegian archbishopric, being hence called 'the apostle of the North'. He was elected pope in 1154, and had a somewhat stormy pontificate. He had troubles both with the Romans and with William, Norman king of Sicily, who refused to recognize the suzerainty of the pope. Adrian received some assistance from Frederick I. (Barbarossa), the German emperor, who was crowned by him at Rome, June 18, 1155; but the emperor became estranged when in 1156 the pope came to terms with William his enemy. Adrian increased the breach by the haughty language of his letters. Frederick, on the other hand, acted in ecclesiastical matters as if there had been no pope. Before these difficulties came to a close Adrian died, September 1, 1159, at Anagni. He was the only Englishman that ever sat in the papal chair. The permission which he gave to Henry II., king of England, to invade Ireland, on the condition that every family of that island should pay annually a penny to the papal chair, because all islands belong to the pope, is worthy of remark. On this grant the subsequent popes founded their claims on Ireland.—ADRIAN V., previously called *Ottoboni da Fiesco*, of Genoa, settled, as legate of the pope, the dispute between King Henry III. of England and his nobles, in favour of the former; but died a month after his election to the papal chair (1276).—ADRIAN VI., born in 1459, son of a mechanic of Utrecht, was professor in Lou

vain, and in 1507 was appointed tutor of the Emperor Charles V. When ambassador of the Emperor Maximilian in 1515, he persuaded Ferdinand the Catholic to nominate young Charles his successor to the Spanish throne; after which he became, in 1516, Bishop of Tortosa and Regent of Spain, and in 1517, cardinal. The Spaniards were not pleased with his severe and often partial government, and expressed great joy when, at the suggestion of Charles V., he was elected to the papal chair, January 9, 1522. He was not less hated at Rome on account of his antipathy to classical literature, and his honest endeavours to reform the papal court, to abolish the prevailing luxury, bribery, and other abuses. His efforts were frustrated by the cardinals, and, if they had been successful, could not have prevented the progress of the Reformation already begun in Germany. Adrian opposed the zeal of Luther with reproaches and threats, and even attempted to excite Erasmus and Zuinglius against him; but his abilities were not equal to the existing emergency. His measures against France also were unsuccessful. Notwithstanding his honest efforts and upright character he died unlamented, September 14, 1523, after a reign of one year and a half. His reign was, according to his own confession, the most unhappy period of his life. On his tomb, in the Church of St. Peter, is the following epitaph:—

Adrianus Papa VI. hic situs est,
Qui nihil sibi infelicius
In vita,
Quam quod imperaret,
Duxit.

ADRIANOPLE (Turkish *Edreneh*), an important city of Turkey in Europe, in the vilayet of the same name, about 135 miles W.N.W. from Constantinople, on the Maritza (ancient *Hebrus*), at its junction with the Tundja and the Arda. It stands on the north side of a large plain begirt with hills, on one of which it is partially built, is approached by several bridges, surrounded by old walls, and defended by a citadel, in which are an arsenal and a cannon-foundry. The streets are remarkably narrow, crooked, and dirty. Among the public buildings the most important are the great mosque with four tall minarets, and a richly decorated interior, believed to be the most magnificent in the Moslem world; a palace, now in a state of decay, once the residence of Sultan Selim; a grand aqueduct, which supplies the city with water, and a splendid bazaar, about 350 paces long, well furnished with jewelry, muslins, shawls, &c. The manufactures consist chiefly of silk, woollen, and cotton stuffs, saddles, and shoes, and otto of roses, tobacco, yellow-berries, valonia, bees'-wax, leather, &c., are exported in considerable quantities. The silk produced here is inferior to that of Brussa, and the mulberry plantations are gradually giving place to corn-fields; the Adrianople or Turkey-red dye, produced from the madder raised here, is celebrated over the whole world. Adrianople has railway communication with Constantinople as well as with Austria-Hungary and the continent generally. The port of Dedeagatch on the Ægean, now more important than Enos at the mouth of the Maritza, is also connected with it by rail. Adrianople received its present name from the Roman emperor Hadrian, who rebuilt it in the second century after Christ. In 1361 it was taken by Amurath I., and was the residence of the Turkish sovereigns till the conquest of Constantinople in 1453. In 1829 it was taken by the Russians, who held it for a time, as they also did in 1878. Pop. (est.), 100,000.

ADRIAN'S (or HADRIAN'S) WALL, a celebrated Roman work in the north of England, raised to protect the Roman conquests to the south of it from the attacks of the Caledonians, and consisting originally of several lines of fortification. We do not know for certain how much of it was constructed by Hadrian, but recent investigators believe that the design, commenced by him about 120 A.D., was essentially completed in his reign, though the Emperor Severus may have restored it and introduced improvements. Notwithstanding the destructive effects of time and the plough, the fortifications may still be traced in a tolerably direct line, curving a little to the north, from the Solway to the Tyne near Newcastle, a distance of about 74 miles. The different lines of works were as follows:—On the northern side was first a ditch 10 or 12 feet deep; on the southern edge of the ditch was a stone wall originally, it is believed, 18 to 20 feet high, though the most perfect remnant is not more than 8. It was from 6 to 8 feet thick, solidly built of blocks of square-hewn freestone, and its remains may still be seen for long distances; south of the wall was an earthen rampart, and then another ditch, followed by two smaller ramparts. At intervals of a Roman mile along the wall were towers 50 or 60 feet square; while at longer intervals there were about twenty stations serving as garrison posts or fortresses, and consisting of groups of buildings within a strongly fortified wall. See The Roman Wall, by the Rev. John C. Bruce.

ADRIATIC SEA, or GULF OF VENICE (ancient *Mare Adriaticum*), an arm of the Mediterranean, stretching in a north-westerly direction from the Straits of Otranto, between the east coast of the Italian Peninsula and the west coasts of Turkey, Dalmatia, and Illyria; length, about 480 miles; average breadth, about 100; area, estimated at about 60,000 square miles. Its depth in the north, between Istria and Venice, is only from 12 to 20 fathoms, but increases in proceeding south to 100 fathoms near its centre, and to 500 fathoms between its centre and its entrance. At the straits, between Otranto and Valona, its depth does not exceed 350 fathoms, but increases very rapidly towards the Ionian Sea. Its opposite shores present a striking contrast, the east being generally bold and rocky, lined with islands and furnished with good harbours, but thinly peopled and comparatively sterile; while the west are low, shallow, marshy, and ill provided with harbours, though generally populous and fertile. The Adriatic is evidently a continuation of the longitudinal valley of the Po, forming a long and narrow trough between the parallel ranges of the Apennines and the mountains of Illyria. The rivers which it receives, particularly the Po, its principal feeder, have produced, and are still producing, great geological changes in its basin by their alluvial deposits. Hence Adria, between the Po and the Adige, which gives the sea its name, though once a flourishing seaport, is now 15 miles inland. The winds of the Adriatic are generally up and down, seldom right athwart; and in summer, when they are usually light and variable, the navigation is considered safe, notwithstanding occasional sudden squalls, which sometimes prove fatal to vessels caught without sufficient sea-room. In winter heavy north blasts, called *boras*, apparently a corruption of *Boreas*, rush down from the whole line of the Julian Alps with irresistible fury. Hence the Venetians, in 1569, prohibited the return of their ships between 15th November and 20th January. The principal trading ports on the Italian side are Brindisi, Bari, Ancona, and Venice; on the opposite side, Ragusa, Fiume, Pirano, Pola, and Trieste, particularly the last, which is the principal seaport of Austria, and possesses a large trade.

ADULE, ADULIS, or ZULLA, a seaport on the west coast of the Red Sea. Though anciently important, as being the trade emporium of the Auxu-

mitæ, it is now a paltry place. Here was found, in 525 A.D., by Cosmas, an Indian merchant, the Monumentum Adulitanum, a Greek inscription recording the conquests of Ptolemy Euergetes in Asia and Thrace. Zulla was the landing-place of the Abyssinian expedition of 1867–68.

ADULTERATION, a term not only applied in its proper sense to the systematic mixture of articles of commerce, food, drink, drugs, seeds, &c., with noxious or inferior ingredients, but also, by magistrates and analysts, to accidental impurity, and even in some cases to actual substitution. The chief objects of adulteration are to increase the weight or volume of the article, such as water added to milk, butter, &c.; to give a colour which either makes a good article more pleasing to the eye or else disguises an inferior one, as Prussian-blue, black-lead, &c., to green teas; annatto to cheese, alum to bread, &c.; to substitute a cheaper form of the article, or the same substance from which the strength has been extracted, as tea mixed with spent leaves; and to give it a false strength, as *Cocculus Indicus* to beer, or alcohol to wine. Few articles of commerce are free from fraudulent adulteration, and the practice of the system has increased with the keen competition among commercial men, and with the abolition of those restrictions which in former times successfully checked dishonest dealers, the guilds and companies of every important city having had stringent corporate regulations for supervising and governing all the various trades and manufactures. There were, besides, ordinances of assize for regulating the price and quality of the common necessaries of life. In Great Britain an enactment to prohibit adulteration was in force as early as 1267, and punishments for it were provided by many subsequent acts, mostly passed during last century. Attention to this pernicious practice was called in the nineteenth century by Accum's Death in the Pot, published in 1822; and in 1855 Dr. Hassall, an excellent analyst, published his Food and its Adulterations. Later, a number of works by Letheby, Pavy, Parkes, and others have appeared, which, with the aid of evidence such as that laid before the commissioners of the House of Commons, have enabled the public to appreciate the nutritive value of pure food, and led to the passing of the important adulteration acts of recent years.

Among the adulterations which are or have been practised for the purpose of fraudulently increasing the weight of an article are the following:—Bread may be adulterated with alum or sulphate of copper, which gives solidity to the gluten of damaged or inferior flour; with chalk or carbonate of soda to correct the acidity of such flour; and with boiled rice or potatoes, which enables the bread to carry more water, and thus to produce a larger number of loaves from a given quantity of flour. By skilful manipulation the dishonest baker can turn out 5 per cent more loaves from a sack of flour than his honest brother tradesman. Wheat flour is adulterated with other inferior flours, as the flour from rice, beans, Indian-corn, potato, and with sulphate of lime, alum, &c. Milk is usually adulterated with water, and boracic acid or formaldehyde is often added. The average specific gravity of milk is 1030 (water being 1000), and if the density of a sample is over that figure, other conditions corresponding, the milk is unusually good. If between 1028 and 1030 it is very likely genuine. At from 1026 to 1028 the quality is doubtful; and below that, unless the quantity of cream is unusually large, the milk is watered. (See the article MILK.) The adulterations that have been found in butter consist of an undue proportion of salt and water, borax, lard, tallow, and other fats. When of poor quality it is frequently coloured with a little annatto. Genuine butter should not contain less than 80 per cent of butter-fat. Cheese is also coloured with annatto, Armenian bole, and other substances. Potted beef and fish are artificially coloured with Armenian bole, and during 1880–90 lard was extensively adulterated with cotton-seed oil and beef-stearine. Tea is adulterated (chiefly in China) with sand, iron-filings, chalk, gypsum, China-clay, exhausted tea leaves, and the leaves of the sycamore, horse-chestnut, and plum, whilst colour and weight are added by black-lead, indigo, Prussian-blue (one of the deleterious ingredients used by the Chinese in converting the lowest qualities of black into green teas for the British and American markets), gum, turmeric, soap-stone, catechu, and other substances. Coffee is mingled with chicory, roasted wheat, roasted beans, acorns, mangel-wurzel, rye-flour, and coloured with burned sugar and other materials. Chicory is adulterated with different flours, as rye, wheat, beans, &c., and sometimes with saw-dust, and coloured with ferruginous earths, burned sugar, Venetian red, &c. Cocoa and chocolate are mixed with the cheaper kinds of arrowroot, animal matter, corn, sago, tapioca, &c. Sugar may be adulterated with various substances of like appearance. Tobacco is mixed with sugar and treacle, aloes, liquorice, gum, catechu, oil and lamp-black, alum, tannic acid and iron, logwood, and such leaves as rhubarb, chicory, cabbage, burdock, coltsfoot, and excess of salt and water. Snuffs are adulterated with lime, fustic, scorched oatmeal, peat-moss, ground valonia cups, bichromate of potash, &c. Confections are adulterated with flour and sulphate of lime, and coloured with indigo, Prussian-blue, artificial ultramarine, carbonate of copper, carbonate of lead, chrome yellow, red-lead, gamboge, arsenite of copper, and various pigments. Preserves are kept green and poisoned by salicylic acid. The pungency of mustard is commonly reduced by flour, and the colour of the compound is improved by turmeric. Pepper is or was adulterated with olive-kernels ('poivrette'), rice, and similar materials.

Adulteration is as extensively and perniciously practised by those who deal in the beverages of the people. Ale is adulterated with common salt, *Cocculus Indicus*, grains of paradise, quassia and other bitters, sulphate of iron, alum, sulphite of lime, &c. Porter and stout are mixed with sugar, treacle, salt, and an excess of water. In 1899–1900 a curious illness in Dublin and Lancashire was traced to the drinking of beer which had been made with glucose containing arsenic. For lemon-juice a mixture of sugar and water acidulated with sulphuric acid has been sold, and sulphite of lime has been used as a preservative. Brandy is diluted with water, and burned sugar is added to improve the colour; sometimes even bad whisky is flavoured and coloured so as to resemble brandy, and sold under its name. Gin is mixed with excess of water, and flavouring matters of various kinds, with alum and tartar, are added. Rum is diluted with water, and the flavour and colour are kept up by the addition of cayenne and burned sugar. Inferior kinds of whisky are adulterated with various noxious drugs to imitate the flavour of the superior brands. For champagne, gooseberry and other inferior wines are often substituted. Claret is fortified with brandy, but other inferior wines are also sold under its name. Port is manufactured from various kinds of inferior wines, the body, flavour, strength, and colour being produced by gum-dragon, the washings of brandy casks, and a preparation of sloe berries, bilberries, &c. Cheap brown sherry is mixed with Cape and other low-priced brandies, and is flavoured with the

washings of brandy casks, sugar-candy, and bitter almonds. Pale sherries are produced by gypsum, by a process called plastering, which removes the natural acids as well as the colour of the wine. Other wines are adulterated with elderberry, logwood, Brazil-wood, cudbear, red beet-root, &c., for colour; with lime or carbonate of lime, carbonate of soda, carbonate of potash, and litharge, to correct acidity; with catechu, sloe leaves, and oak-bark for astringency; with sulphate of lime, Spanish earth, and alum for removing colour; with cane-sugar for giving sweetness and body; with alcohol for fortifying; and with ether, especially acetic ether, for giving bouquet and flavour. What is frequently sold as vinegar is merely a compound of burned sugar, water, and sulphuric acid.

With respect to drugs, there is a large field open for adulteration, and it has been fully taken advantage of, though this has at all times been considered as a serious offence. Vegetable medicines, such as jalap, opium, rhubarb, chinchona bark, scammony, aloes, sarsaparilla, squills, &c., are mixed with foreign substances to make up for the loss of weight in drying and powdering, the customary trade allowance being only 4 per cent, whereas in many cases it amounts to from 6 to 25 per cent. Castor-oil has been adulterated with other oils, even small quantities of croton-oil; and inferior oils are often mixed with cod-liver oil. Cantharides are often mixed with golden-beetle and even artificially-coloured glass. The mineral drugs are still more extensively sophisticated. The Society of Public Analysts hold a drug to be adulterated if, when retailed for medicinal purposes under a name recognized in the British Pharmacopœia, it is not equal in strength and purity to the standard laid down in that book; or if, when sold under a name not recognized in the British Pharmacopœia, it differs materially from the standard laid down in approved works on materia medica, or the professed standard under which it is sold.

Notwithstanding the heavy penalties inflicted for the adulteration of seeds, extensive and systematic frauds are still practised. These frauds are carried on in manufactories fitted up with complicated machinery and elaborate scientific processes, which enable the adulterators in many cases to avoid detection for a long period of time. The seed which forms the adulterant is, of course, of the most worthless kind that can be had. Thus, turnip-seed is mixed with rape, wild mustard, or charlock, which are steamed and kiln-dried to destroy their vitality, so as to evade detection in the progress of growth; old turnip-seed (kiln-dried), which can be bought in commerce by the ton, is also used fraudulently mixed with fresh seed. The dishonest gain obtained by such a system may be estimated when we state that rape seed worth 50*s.* per quarter is mixed with turnip seed worth £10 per quarter. Trefoil, worth 16*s.* per cwt., is used to adulterate red clover of over five times its value. Clover is also much mixed with plantain and mere weeds. Seeds that have become brown by long keeping have their colour brightened up by the fumes of sulphur, which, however, destroy the vitality of the seed. The adulteration of seeds is taken cognizance of by 32 and 33 Vict. cap. cxii.

The statute under which cases of adulteration of food and drugs are now tried is the Sale of Food and Drugs Act of 1875, as subsequently amended, especially by the Sale of Food and Drugs Act of 1899. 'Food' is defined by the latter act to mean any article used for food or drink by man (except drugs or water), or which ordinarily enters into or is used in the composition or preparation of human food, and it includes flavouring matters and condiments. The act declares that no one shall, by himself or another, mix, colour, stain, or powder any article of food with any material or ingredient that will render it injurious to health, with intent to sell it in that state; nor shall anyone sell any article so treated. The penalty in either case is a fine not exceeding £50, or, in aggravated cases, three months' imprisonment, with or without hard labour, for a first offence, and every subsequent offence may be punished by imprisonment for six months with hard labour. The same provision is made as regards drugs. The seller, however, may plead that he did not know that the article was adulterated, and could not with reasonable diligence have ascertained the fact. A penalty of not more than £20 is also enacted against any person who shall sell, to the prejudice of the purchaser, any article of food or any drug that is not of the nature, substance, and quality of the article demanded by such purchaser. A second offence of this kind entails a penalty of £50, and a third, one of £100. The mixture of food and drugs with harmless ingredients is allowed in certain specified cases, as when they are thus the better prepared as articles of commerce, and where there is no fraudulent intention, and provided a label is given with the article setting forth that it is mixed. Besides the fraudulent mixing of ingredients, the abstraction of any part from an article of commerce, so as thereby to affect injuriously its quality, substance, or nature, is punished similarly, as is also the sale of such article. Provision is made for the appointment, by the courts of quarter sessions, town-councils, and other authorities, of analysts, and their duties defined. Proceedings before justices are allowed on the certificate of an analyst, which is to be considered sufficient evidence of the things therein stated—an appeal being given to quarter sessions. The adulteration of butter and fraudulent sale of margarine was dealt with by the Margarine Act of 1887, and the above act of 1899 extended its provisions to margarine-cheese. Fines of £20, £50, and £100 for first, second, and subsequent offences are levied on importers of unmarked margarine or margarine-cheese, adulterated or impoverished butter, milk, or cream, unless marked as such; condensed, separated, or skimmed milk, unless distinctly so named; and any adulterated or impoverished article to which the king in council directs the section to apply. The Board of Agriculture is associated with the Local Government Board in the administration of the acts. See MARGARINE.

ADULTERY, the voluntary sexual intercourse of a married person with another than the offender's husband or wife. It may be committed between two married persons, or between two one only of whom is married; in the former case the offence is called double, and in the latter single adultery. The Greek and early Roman law only recognized the offence when a married woman was the offender. By the Jewish law adultery between a married woman and a man not her husband was punished with death, the penalty being inflicted on both parties by stoning—but latterly probably a much lighter penalty was imposed. Strabo says the crime was capitally punished also in Arabia. Among the ancient Egyptians it was not common, but when it did occur 1000 lashes were inflicted on the man, and the woman was deprived of her nose. In Greece the laws against it were severe. The rich were sometimes allowed to redeem themselves by paying a fine, in which case the woman's father returned the dower which he had received from the husband. Some suppose it was refunded by the adulterer. By the laws of Draco and Solon adul-

terers, when caught in the act, were at the mercy of the injured party. Adulteresses were prohibited in Greece from appearing in fine garments and entering the temples. Some suppose that this offence was made capital by a law of Romulus, and again by the Twelve Tables; others that it was first made capital by Augustus; and others not till the reign of Constantine. The fact is that the punishment was left to the discretion of the husband and parents of the adulteress. The most usual mode of taking revenge was by mutilating, castrating, or cutting off the ears or nose. The punishment assigned by the Lex Julia de Adulteris, instituted by Augustus, was banishment or a heavy fine. It was decreed by Antoninus that to sustain a charge of adultery against a wife the husband who brought it must be innocent himself. Under Macrinus adulterers were burned. Under Constantius and Constans they were burned or sewed in sacks and thrown into the sea. But the punishment was mitigated under Leo and Marcian to perpetual banishment or cutting off the nose; and under Justinian the wife was only to be scourged, lose her dower, and be shut up in a monastery; at the expiration of two years the husband might take her again; if he refused she was shaven and made a nun for life. In some parts of India it is said that any woman may prostitute herself for an elephant, and it is reputed no small glory to have been rated so high. Among the Japanese and some other nations adultery is punishable only in the woman. Among the Abyssinians the crime of the husband is punished on the innocent wife. On the contrary, in the Mariana Islands the woman is not punishable, but the man is, and the wife and her relations waste his lands, burn him out of the house, &c. Among the Chinese adultery is not capital; fond parents will even make a contract with the future husbands of their daughters to allow them the indulgence of a gallant. By the ancient laws of France this crime was punishable with death. In Spain personal mutilation was frequently the punishment adopted. The Saxons consigned the adulteress to the flames, and over her ashes erected a gibbet, on which her paramour was hanged. King Edmund the Saxon ordered adultery to be punished in the same manner as homicide; and Canute the Dane ordered that the offender should be banished, and the woman have her ears and nose cut off. In the time of Henry I. the punishment was equally barbarous.

Adultery is in England considered a spiritual offence, cognizable by the spiritual courts, where it is punished by fine and penance. The common law allows the party aggrieved only an action and damages. A man can obtain a dissolution of his marriage on the ground of his wife's adultery, and a wife can obtain a judicial separation on the ground of her husband's adultery, or a dissolution of the marriage if the offence is coupled with cruelty, desertion, or bigamy. In France divorce was abolished on religious grounds in 1816, and only re-established in 1884, when three grounds of divorce were admitted: adultery under any circumstances by husband or wife; the injurious treatment of one by the other; the legal condemnation of either for serious crime. By a further law of 1886 the legal procedure connected with divorce was rendered less complicated and more expeditious. In the United States the punishment of adultery has varied materially at different times. In the state of Massachusetts an adulterer or adulteress may be set on the gallows for one hour, be publicly whipped, be imprisoned, or fined. All or any of these punishments may be inflicted, according to the degree of the offence. Adultery is, however, very seldom punished criminally in the United States.

AD VALOREM (Lat. 'according to the value'), a term applied to customs or duties levied according to the worth of the goods, as sworn to by the owner, and not according to number, weight, measure, &c.

ADVANCE NOTE, a draft on the owner of a vessel, generally for one month's wages, given by the master to the sailors on their signing the articles of agreement. The granting of such notes to British sailors was made illegal by an act passed in 1880.

ADVENT (from the Latin *adventus*, coming or arrival, *i.e. adventus Redemptoris*), as an ecclesiastical term, signifies 'the coming of our Saviour.' The name is applied to the holy season which occupies the time from Advent Sunday to Christmas, Advent Sunday being the nearest Sunday to St. Andrew's Day, or the first Sunday after November 26th. Advent is regarded as a period of preparation for Christmas, as Lent is for Easter. This holy season is first mentioned apparently about the middle of the fifth century, but there is a tradition that it was instituted by St. Peter. The celebration of nuptials in Advent has been forbidden since the Council of Lerida in the sixth century.

ADVENTISTS, a small religious sect of the United States, who believe in the speedy coming of Christ, and in his reigning on earth for a thousand years, and who generally practise adult immersion. There is also a sect called *Seventh-day Adventists*, who hold that the coming of Christ is at hand, and keep the seventh day of the week sacred. Both sects are also represented in Europe.

ADVENTURERS, THE SOCIETY OF, an ancient company of merchants, erected for the discovery of unknown regions, opening new channels of trade, &c. It originated in Burgundy, and was established by John, duke of Brabant, in 1248, for the encouragement of English and other merchants at Antwerp. It was afterwards confirmed in England by Edward III. and IV., Richard III., Henry IV. V. VI. and VII., and by patent of the last-mentioned monarch in 1505 they received the title *merchant adventurers*. The influence of the English merchant adventurers at Antwerp was in 1550 so great that they were able to resist successfully the establishment of the Inquisition in that city.

ADVERB, one of the indeclinable parts of speech, so called from being frequently joined to a verb for the purpose of limiting or extending its signification, as, *I fear greatly, I readily consent.* They may also qualify adjectives, as, *very cold, naturally brave;* and other adverbs, as, *very generally acknowledged, much more clearly.* Adverbs may be placed either before or after the words which they qualify. They may be classified as follows:—1, adverbs of time, as, *now, then, never*, &c.; 2, of place, as, *here, there, where*, &c.; 3, of degree, as, *very, much, nearly, almost*, &c.; 4, of affirmation, negation, or doubt, as, *yes, no, certainly, perhaps*, &c.; 5, of manner, as, *well, badly, clearly*, &c. In English a great many adverbs are formed by adding to an adjective the syllable *ly* (a contracted form of the word *like*), as, *wise, wisely.*

ADVERTISEMENT DUTY, a duty of 3*s.* 6*d.* imposed previously to 1833 on all advertisements whether long or short. This was manifestly unfair, as the notice of a cheap pamphlet, or of a servant in want of a place, was taxed as heavily as the intimation of the sale of an estate. In that year public pressure induced the government to reduce the duty to 1*s.* 6*d.*; and in 1853 it was entirely repealed. In the last year of the collection of this tax it produced to the government the sum of £181,196.

ADVOCATE, a lawyer authorized to plead the cause of his clients before a court of law. This profession has played a conspicuous part in almost every civilized country. Among the Romans the term

advocatus was not, in the time of Cicero, applied to the orator or *patronus* who made the speech, but under the emperor it signified a person who assisted a cause in any way, and was sometimes equivalent to orator. The functions of the advocate who conducted the case in public were quite distinct from those of the *procurator*, or as we would term him solicitor, attorney, or agent, who represented his client in the litigation, and supplied the advocate with information as to the facts of the case. The assistance of an advocate was generally secured by a present, and though he could not sue for the value of his services, any honorarium so given could not be demanded back, even although he died before the anticipated service was rendered. In England and Ireland those members of the legal profession who specially act as advocates are called *barristers* (see BARRISTER); but in Scotland the ancient name has been retained for those who plead before the supreme courts (see ADVOCATES, FACULTY OF). In France the *avocat* is called on by the client to give advice as to the law, and to conduct the cause by written and oral pleadings; the *avoué*, on the other hand, represents his clients before the tribunals, drafts and prepares all formal acts and writings, and prepares the lawsuits for the oral debates.

ADVOCATE, LORD (called also the *King's* or *Queen's Advocate*), the principal law officer of the crown in Scotland. He is the public prosecutor of crimes, senior counsel for the crown in civil causes, and up till 1885 was virtually secretary of state for Scotland. Being appointed by the crown, he goes out of office with the administration to which he belongs. As public prosecutor he is assisted by the solicitor-general and by four junior counsel called advocates-depute. The procurators-fiscal make the preliminary inquiries into crimes committed within their districts and transmit their papers to the lord-advocate, when the case is either left to the procurator-fiscal, or is carried before the lord-advocate, or one of his assistants in the judiciary courts. In crimes of a capital nature he has the power of restricting the sentence to an arbitrary punishment, or a punishment at the discretion of the judge which does not extend to death. When in Parliament, of which he is almost invariably a member, he is expected to superintend the legislation connected with Scotland. The lord-advocate and the solicitor-general are the only members of the Scotch bar who have seats within the bar and the distinction of silk gowns; and both of these functionaries, in addition to their official duties, accept of ordinary bar practice. The office of king's advocate appears to have been established about the beginning of the sixteenth century. His salary has recently been raised to £5000 a year, having been previously only £3238, including an allowance of £850 for fees abolished.

ADVOCATES, FACULTY OF, the name given to the highest class of lawyers in Scotland, corresponding to the English barristers. As a body the Faculty of Advocates, which has at its head a *dean* and a *vice-dean*, exists only by a prescriptive title, and possesses no charter of incorporation, but its institution appears to be coeval with the establishment of the College of Justice by James V. in 1532. As a profession, that of advocate existed in Scotland at least as early as the commencement of the fifteenth century, and the constitution of the body seems to have been modelled on the corporations of *avocats* in France, presided over by a *doyen* or dean. The conducting of the oral pleadings in the Court of Session is for the most part limited to advocates, though not necessarily so, and they have the exclusive privilege of signing all the written pleadings lodged in process, with the exception of the defences. They are also competent to plead in all the inferior Scottish courts and in the House of Lords in cases of appeal from judgments of the Court of Session. The supreme judges in Scotland, as well as the sheriffs-depute of the various counties, are invariably selected from the faculty, and the continued accession of members is no doubt due to the fact that the bar is still considered the chief avenue to official and public life in Scotland. The number of members on the faculty roll is over 400, but the number of practising advocates does not exceed 120. Candidates for admission must undergo two separate examinations, one in general scholarship and the other in law. The former comprises the following subjects:—1, Latin; 2, Greek, or two modern languages; 3, Metaphysics and Moral Philosophy; 4, Logic or Mathematics. This examination is, however, dispensed with if the applicant for admission has taken the degree of Master of Arts in any British university, or such a degree in any foreign university as will, in the opinion of the Dean of Faculty and his council, afford evidence of equal attainments in scholarship. After passing these examinations, the candidate, on the expiration of a year from their date, may present himself for his second examination in law; but in the interval he must not have been engaged in any trade or occupation, either on his own behoof or in the employment of another. He must also produce evidence of having attended the law classes in the Edinburgh University. The fees of admission, stamp for commission, &c., amount to about £336, a great portion of which is devoted to the maintenance of the library belonging to the faculty, which is one of the most extensive in the kingdom. (See ADVOCATES' LIBRARY.) There is also a statutory widows' fund belonging to this body.

ADVOCATES' LIBRARY, the name of the chief library in Scotland. About the year 1682 the Faculty of Advocates in Edinburgh founded a library upon an extensive plan, suggested by Sir George M'Kenzie of Rosehaugh, advocate to Charles II. and James II., who enriched it with many valuable books. It had no fixed fund at first, but was increased by donations and by such sums as the faculty from time to time devoted to the purchase of books. As the donations were not confined to advocates the library was considered a kind of public library, and it has continued to retain this character. In 1709 it obtained, along with eight other libraries, the right to a copy of every new book published in Britain, which right it still possesses. The number of volumes is estimated at over 490,000, so that the library is probably inferior only to that of the British Museum and the Bodleian at Oxford. It is very rich in history, law, and English literature, but is deficient in science and foreign literature. The collection of MSS. amounts to about 3000 volumes. Any stranger arriving in Edinburgh is admitted to the library, but an introduction is required to enable one to resort habitually to it. Books may be borrowed by any one having an order from a member of the Faculty of Advocates.

ADVOCATUS DIABOLI (the Devil's advocate), in the Roman Catholic Church, a functionary who, when a deceased person is proposed for canonization, brings forward and insists upon all the weak points of the character and life of the deceased, endeavouring to show that he is not worthy of sainthood. The opposite side is taken by the *Advocatus Dei*, God's advocate.

ADVOWSON, in English law, a right of presentation to a vacant benefice, or, in other words, a right of nominating a person to officiate in a vacant church and receive the emoluments of the charge. Those who have this right are styled *patrons*. Advowsons are of three kinds—*presentative*, *collative*, and

donative: presentative, when the patron presents his clerk to the bishop of the diocese to be instituted; *collative*, when the bishop is the patron, and institutes or *collates* his clerk by a single act; *donative*, when a church is founded by the king, or any person licensed by him, without being subject to the ordinary, so that the patron confers the benefice on his clerk without presentation, institution, or induction.

ÆACUS, son of Zeus and the nymph Ægina, daughter of the river god Asopus. He acquired the government of the island called after his mother, and became, by his uprightness, a favourite with the gods. In compliance with his prayers his father peopled anew the island, which had been depopulated by the plague. The new inhabitants were said to have sprung from ants, and were termed on that account *Myrmidons*. Greece, too, was delivered at his entreaty from a great drought and famine. The name of his wife was Endeis, and Peleus and Telamon were his children. Æacus, on account of his love of justice, was joined with Minos and Rhadamanthus in the office of judging the dead. He is represented as seated upon a tribunal, bearing a crown and sceptre; as a distinguishing mark he carries the key of the infernal world, given to him by Pluto.

ÆDILES, Roman magistrates of secondary rank, who had the supervision of the national games and spectacles; of the public edifices, such as temples (the name comes from *ædes*, a temple); of private buildings, of the markets, cleansing and draining the city, &c. At first (494 B.C.) there were but two, chosen from the common people (*ædiles plebeii*). In 365 B.C. two more were added from among the patricians, to whom an ivory chair (*sella curulis*) was allowed, and who were thence called *ædiles curules*. Julius Cæsar added a third class (*ædiles cereales*), to whose care the public granaries were intrusted. The ædiles existed under the emperors, but their powers were gradually diminished, and their functions were exercised by new officers elected by the emperors.

ÆDUI, or HEDUI, were one of the most powerful nations of Gaul, and lived between the Liger (Loire) and the Arar (Saône). They were the first Celtic people who formed an alliance with the Romans, by whom they were termed brothers and relations. On the arrival of Julius Cæsar in Gaul (B.C. 58) they were subject to Ariovistus, but their independence was restored by Cæsar. Their chief town at this date was Bibracte, assumed to be on the site of the later town of Augustodunum (Autun).

ÆGADEAN ISLANDS, a group lying off the western extremity of Sicily, and consisting of Maritimo, Favignana, Levanso, and Le Formiche. Favignana, the largest, is about 14 miles in circuit, and has productive tunny and anchovy fisheries.

ÆGÆON. See BRIAREUS.

ÆGEAN SEA, that part of the Mediterranean now more usually called the Grecian Archipelago, which washes the eastern shores of Greece, the southern coast of Macedonia and Thrace, and the western coast of Asia Minor. The real etymology of the name is uncertain; some ancient grammarians derive it from the town Ægæ, in Eubœa; others from Ægea, queen of the Amazons, who perished in the sea; and others again from Ægeus, the father of Theseus, who cast himself into it from a rock, under the mistaken impression that his son had been devoured by the Minotaur.

ÆGEUS, King of Athens and father of Theseus, by Æthra, daughter of Pittheus, king of Trœzene. He caused Theseus to be secretly educated at Trœzene, to deceive the sons of Pallas (Pallantides), who expected to succeed him, on the supposition that he was childless. In order that he might recognize his son he concealed a sword and some other articles under a stone on his departure from Trœzene, and left orders that Theseus should bring them to Athens when he had reached a certain age. As soon as this young hero became acquainted with his birth he hastened to Athens, where he was at first repulsed, and in danger of his life; but his father finally acknowledged him, and declared him successor to his throne. Under the erroneous idea that Theseus had been devoured by the Minotaur, Ægeus plunged into the sea, from which circumstance, according to some ancient grammarians, the Archipelago between Greece and Asia, as far as the Hellespont, received the name of the Ægean Sea. See THESEUS.

ÆGINA, now EGINA or ENGIA, a Greek island in the Gulf of Ægina (ancient, *Saronic Gulf*). It is triangular in form, about 8 miles in length and as much in breadth, and has an area of about 40 square miles. Except the western half, which consists of a well-cultivated plain, it is mountainous and unproductive. On the side of a hill in this part stands the modern town of Egina, with about 5000 inhabitants. The ancient Ægina was situated on the coast. The population of the island is about 9000, who are chiefly engaged in trade and navigation, and in cultivating the soil, which produces various fruits, including the best almonds in Greece, wine, olives, and grain. Ægina held an important place in the ancient history of Greece. Æacus ruled here, and was regarded as the tutelary deity of the island. It was colonized by Dorians from the opposite coast of Peloponnesus. In the latter half of the sixth century B.C. it had a flourishing commerce, a large navy, and was the seat of a distinct school of art. At the battle of Salamis (480 B.C.) the Æginetan ships behaved with great valour, and materially contributed to the success of the Greeks. In 456 the island fell under the power of the Athenians, who had long been at feud with the Æginetans, and in 431 the latter were expelled to make room for Athenian settlers. It never recovered its prosperity, though its natural inhabitants were afterwards restored. On a hill on the north-east of the island are the remains of a splendid temple of Zeus Panhellenius, or as others maintain of Athena, many of the columns of which are still standing. Here were found in the early part of the nineteenth century a number of marble statues which once adorned the eastern and western fronts of the temple. They were purchased by the King of Bavaria in 1812, and the deficient parts restored by Thorwaldsen. They are now among the chief ornaments of the Glyptothek at Munich. These works are valuable as faithful imitations of nature, and for the light which they shed over one of the darkest periods in the history of art. They showed that the Æginetan style of art was independent of the Attic. The Æginetan figures now exhibited at Munich are seventeen. They may be divided into four classes: (1) upright, clothed, and female; (2) advancing or fighting combatants; (3) kneeling, or archers; (4) lying, or wounded. The largest of the figures is that of Athena, which is a little above the human size; all the others are rather below this measure. Though in these figures there is a wonderfully exact imitation of nature, yet there is a certain stiffness about them, and an unnatural sameness of expression in all. The arrangement of the drapery also is artificial. They should probably be assigned to a period between the sixtieth and eightieth Olympiads (540–460 B.C.). The marble of which they are wrought is Parian, of the kind usually called Grechetto. They, as well as the other carvings about the temple, were painted.

ÆGINETA, PAULUS, a celebrated physician, born in the island of Ægina, whence he derived his name. According to Le Clerc he flourished in the fourth century, but Abulfaragius, who is considered the

best authority, places him three centuries later. He travelled through Greece and other countries, and resided for some time at Alexandria to extend his medical knowledge. His principal work is a treatise, in seven books, on the Medical Art, which was published in the original Greek at Venice in 1528. A Latin translation, with a commentary, was published at Basel by J. Cornarius in 1556. Æginetа wrote also Wholesome Precepts for the Preservation of Health, and a work on the Critical Periods of Life. His knowledge of surgery was extensive, and he was also particularly skilful in disorders of the female sex, and is considered the first practitioner who deserves the title of accoucheur.

ÆGIS, the shield of Zeus, who is called by Homer the Ægis-bearer. It derives its name from its being covered with the hide (*aigis*) of the she-goat Amaltheia, which suckled the god during his infancy in Crete. Homer asserts that it was borrowed at times by Apollo and Athena. In its centre was fixed the head of Medusa, which turned all who looked upon it into stone. Later writers and artists represent the ægis as a metal cuirass or breast-plate, in which the Gorgon's head is set, and with which Athena is often figured as being protected. In a figurative sense ægis denotes protection.

ÆGLE, a genus of plants of the natural order Aurantiaceæ. The *Ægle Marmelos* is the tree which produces the bhel fruit. This fruit is most delicious to the taste, being exquisitely fragrant and nutritious, but laxative. When a little unripe it has been long used in India with great effect as an astringent in cases of diarrhœa and dysentery, and it has recently been introduced as such into English medical practice. The mucus of the seed is used as a good cement for some purposes, and in Ceylon the Dutch prepare a perfume from the rind. A decoction of the root and bark is supposed on the Malabar coast to be a sovereign remedy in hypochondriasis, melancholia, and palpitation of the heart; and the leaves in decoction are used in asthmatic complaints. The tree is found over the greater part of Hindustan.

ÆLFRIC, the name of several eminent Anglo-Saxons, regarding whose lives there is much uncertainty and confusion. One of these became Archbishop of Canterbury after having been a Benedictine monk at Abingdon, abbot of St. Alban's, and Bishop of Ramsbury and Wilton. He was translated to Canterbury in 995, and died highly venerated, Nov. 1005. Another Ælfric (called *Grammaticus*, or the grammarian), who was the author of various Anglo-Saxon works, has sometimes been identified with the archbishop, but he appears to have flourished at a somewhat later period, to have been a monk of Abingdon, and to have died abbot of Ensham. Among his writings are a number of homilies or sermons, a treatise on the Old and New Testaments, a Latin grammar and glossary for the use of English boys, an Anglo-Saxon and Latin reading-book, an abridgment and translation of the first seven books of the Bible, with the book of Job, &c. An Ælfric, Archbishop of York, who died in 1051, has been credited by some authorities with the authorship of the above-mentioned works.

ÆLIANUS, Claudius, a Greek author who lived at Prænestе about A.D. 221. He was a learned sophist, and has left two works compiled in a pretty good style—a collection of stories and anecdotes, and a natural history of animals. Of the first work, one of the best critical editions was published by Gronovius at Leyden (1731), two vols. 4to. Later editions have been published by Kuhn (Leipzig, 1780), Coray (Paris, 1805), and by Hercher (Leipzig, 1864–66). Its chief value arises from its containing many passages from works of older authors which are now lost.

ÆMILIUS PAULUS, surnamed *Macedonicus*, a noble Roman of the ancient family of Æmilii, born B.C. 230, died 160. He conquered Perseus, king of Macedon, and on this occasion obtained a triumph, B.C. 168. During the triumph two of his sons died. He bore the loss like a hero, and thanked the gods that they had chosen them for victims to avert bad fortune from the Roman people. He was father of the renowned Scipio Africanus the younger. His father, a brave general in the second Punic war, commanded and was slain at the battle of Cannæ, B.C. 216.

ÆNEAS, a character celebrated in the traditions of ancient Greece and Rome. He was said to have been the son of Anchises and Venus, and next to Hector the bravest among the heroes of Troy. He is the hero of the Æneid, in which his life is thus described:—In the night of the capture of Troy by the Greeks Hector warned him in a dream to fly with the images of his gods. Æneas rushed notwithstanding this warning to the fight, but fought in vain. After Priam was slain he returned at the command of his mother to his home, and carried off his father, his child, and his household gods, but lost his wife Creusa in the confusion of his flight. With twenty vessels he sailed for Thrace, where he began to build the city of Ænos, but terrified by a miracle abandoned the attempt. From thence he went to Delos to consult the oracle. Misunderstanding its reply he went to Crete, from which he was driven by a pestilence. Thence he directed his course to the promontory of Actium, where he celebrated games in honour of Apollo. In Epirus he found Helenus and Andromache. Thence he sailed by Italy, passed the Straits of Messina, and circumnavigated Sicily to Cape Drepanum on the western coast, where Anchises died. A tempest drove him on the shore of Africa, where Dido received him kindly in Carthage, and desired to detain and marry him. To her he relates, in the episode of the second and third books of the Æneid, the fall of Troy and his wanderings. Jupiter, however, mindful of the fates, sent Mercury to Æneas, and commanded him to sail for Italy. Whilst the deserted Dido ended her life on the funeral pile, Æneas set sail with his companions, and was cast by a storm on the shores of Sicily, in the dominions of his Trojan friend Acestes, where he celebrated funeral games in honour of his deceased father. The wives of his companions, weary of a seafaring life, and instigated by Juno, set fire to the ships, on which he resolved to depart, leaving behind the women and the sick. In this resolution he was confirmed by Anchises, who admonished him in a dream to descend by the aid of the sibyl into the infernal regions after his arrival in Italy. He built the city Acesta and then sailed for Italy, where he found the sibyl near Cumæ, who foretold his destiny and aided his descent into the lower world. Here he saw his father Anchises, and had a prophetic vision of the glorious destinies of his race, and of the future heroes of Rome. On his return he embarked again, and reached the eastern shore of the river Tiber, in the country of the Laurentian king Latinus. The king's daughter Lavinia was destined by an oracle to a stranger, but promised by her mother Amata to Turnus, king of the Rutuli. This occasioned a war, after the termination of which, Turnus having fallen by his hand, Æneas married Lavinia. His son by Lavinia, Æneas Sylvius, was the ancestor of the kings of Alba Longa, and of Romulus and Remus, the founders of the city of Rome. By his first wife he had a son, Ascanius, who built Alba Longa, from whose son, Iulus, the Romans derived the Julian family. For the different traditions respecting Æneas, and the probability of

their late introduction among the Romans, see Niebuhr's Roman History, chapter entitled, 'Æneas and the Trojans in Latium', and other works on the history of the Roman people. The first six books of the Æneid are modelled on the adventures of Ulysses in the Odyssey, and contain more variety and adventure than those that follow, which are founded on the pattern of the battles of the Iliad.

ÆNESIDEMUS, a Greek sceptic philosopher who belonged to the first century B.C., and was born, it is said, at Cnossus in Crete. Nothing is known of his personal history, but the names of his works and an outline of their contents have come down to us. For a sketch of his philosophical opinions see SCEPTICISM.

ÆNIGMA, a proposition put in obscure, ambiguous, and generally what appear to be contradictory terms, to puzzle or exercise the wit in finding out its meaning. Many nations have shown a fondness for them in the infancy of their cultivation. A great part of the Egyptian learning is said to have been comprised in ænigmas. In these, too, the ancient oracles usually spoke. Ænigmas were anciently in vogue among the Jews.

ÆOLIAN HARP, or ÆOLUS' HARP, was introduced into England about the middle of the eighteenth century. It is generally a simple box of thin fibrous wood (often of deal), to which are attached a number of fine catgut strings, sometimes as many as fifteen, stretched on low bridges at each end, and carefully tuned so as to be in unison. Its length is made to correspond with the size of the window or other aperture in which it is intended to be placed. Its width is about five or six inches, its depth two or three. It must be placed with the strings uppermost, under which is a circular opening in the centre, as in the belly of the guitar. When the wind blows athwart the strings it produces the effect of a choir of music in the air, sweetly mingling all the harmonic notes, and swelling or diminishing the sounds according to the strength or weakness of the blast. A simpler kind of Æolian harp has no sounding-board, but consists merely of a number of strings extended between two deal boards.

ÆOLIANS (Greek, *Aioleis*), one of the four races into which the ancient Greeks or Hellenes were divided, and according to tradition deriving their name from Æolus, son of Hellen, and grandson of Deucalion. The district of Æolis in Thessaly was their original abode, from which they spread over other parts of Greece. In early times they were the most numerous and powerful of the Hellenic races. They chiefly inhabited Northern Greece and the western side of Peloponnesus. They appear to have had a predilection for maritime situations, and to have chosen Poseidon as their chief deity. A portion of them went to Lesbos and Tenedos and the north-west shores of Asia Minor, giving the territory thus taken possession of the name of Æolis. Here they possessed a number of cities, and long continued free; afterwards they came under the dominion of Crœsus, king of Lydia, then of the Persians. After the failure of the great Persian invasion of Greece they regained their liberty, but once more came under the Persian dominion, and so remained till the time of Alexander. At length, after forming part of the dominions of the kings of Syria and of Pergamus, they were finally incorporated in the Roman province of Asia. Their language, the Æolian dialect, was one of the three principal dialects of the Greek. It was cultivated for literary purposes chiefly at Lesbos, and was the dialect in which Alcæus and Sappho wrote. Their country was one of the most fertile in the world.

ÆOLIPILE (*Æoli pila*, the ball of Æolus), a spherical vessel of metal, with a pipe of small aperture, through which the vapour of heated water in the ball passes out with considerable noise. Or it may have two nozzles so arranged that the steam rushing out causes it to revolve on the principle of the Barker's mill. It was known to the ancients, being mentioned by Vitruvius.

ÆOLUS, in Greek mythology a name given to three personages who appear to be often confounded and connected in various ways. The name is best known as that of the god—or at least the steward and controller—of the winds, who figures in the wanderings of Ulysses, as described in Homer's Odyssey. He lived in an island adjacent to Sicily, and gave the Greeks a bag of winds to carry them home, but having rashly let them escape they were driven back. The isle of Æolus was generally believed to be the island of Lipara, to the north of Sicily. He is described as pious and just, hospitable to strangers, and the inventor of sails. Another Æolus was the ancestor of the Æolians (which see). He is also said to have been the great-grandfather of this Æolus.

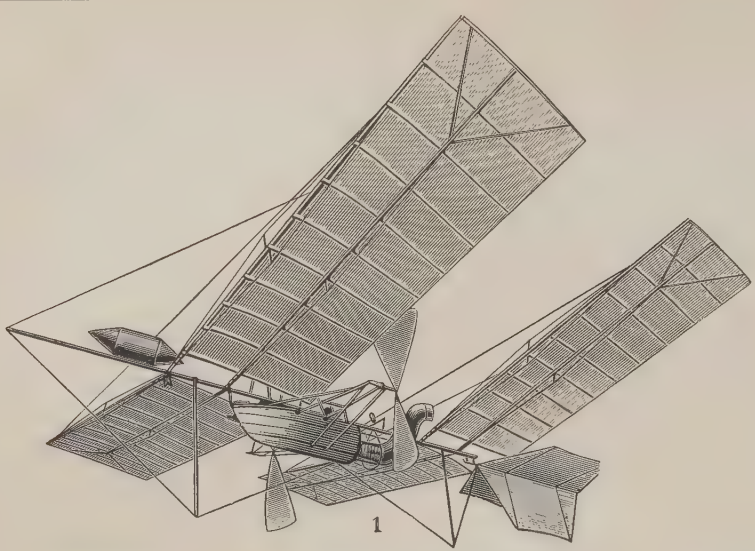
ÆON, a Greek word signifying life, an age, and sometimes eternity, but used by the Gnostics to express spirits or powers that had emanated from the Supreme Mind before the beginning of time. They held both Christ and the Holy Spirit to be æons.

ÆQUI, an ancient people of Italy, conspicuous in the early wars of Rome. They inhabited the mountain district between the upper valley of the Anio (Teverone) and Lake Fucinus. Their origin is unknown; but they were probably akin to the Volscians, with whom they were in constant alliance. They encountered the Romans as early as the time of the kings; but the period of their greatest power was after the fall of the Roman monarchy. They then began to make extensive encroachments on the Latins, who applied to the Romans for assistance, and a long succession of wars began in which the Romans and Latins were commonly allied against the Volscians and the Æqui. Notwithstanding occasional defeats the latter alliance continued to make head, and numerous Roman towns fell into the hands of the Æqui. They were defeated by Cincinnatus in B.C. 458, about which time they had reached the culminating point of their power. They were defeated again by the dictator Postumus Tubertus in B.C. 428. The final struggle in which they were subdued took place about B.C. 304–302. Soon after they were admitted to Roman citizenship, being included in the new tribes Aniensis and Terentina. Henceforth their name disappears from history; but the inhabitants of the upper valleys began to be called Æquiculi, by which name they are mentioned by Virgil as predatory mountaineers. The name Æquiculani occurs in Pliny.

ÆRA, or ERA, is used synonymously with *epoch* for a fixed point of time from which a series of years is counted; it is also applied to the series of years itself which has elapsed since any given date or epoch. The word *æra* was originally a Latin plural noun (plural of *æs, æris*, brass or copper), and meant at first counters, then items in an account or list, and latterly, as a singular, computation, reckoning, and finally a reckoning of years. For an account of the different eras used in chronology see the article EPOCH.

AËRATED BREAD. See BREAD.

AËRATED WATER is the name commonly given to water impregnated with carbonic acid or oxygen. Mineral waters used for medicinal purposes are frequently aërated to render them more palatable and exhilarating. Water simply aërated and flavoured with lemonade or fruit syrups is now used very largely, especially in summer as a refreshing beverage.



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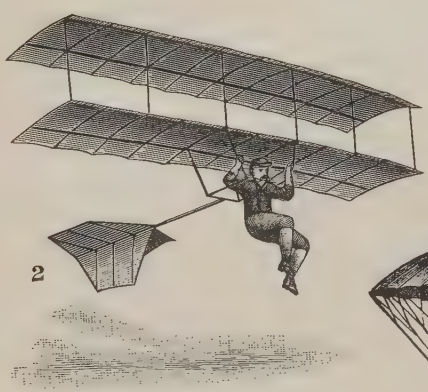

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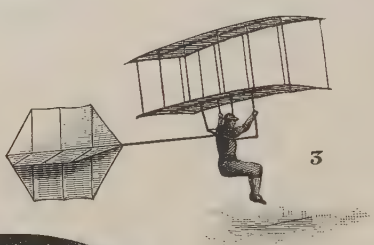

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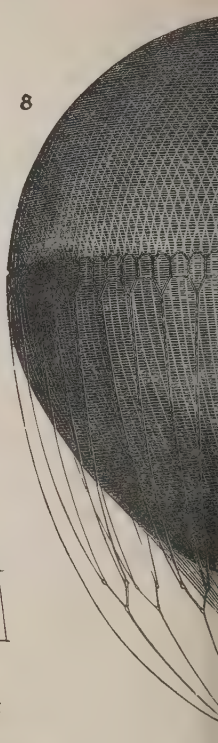

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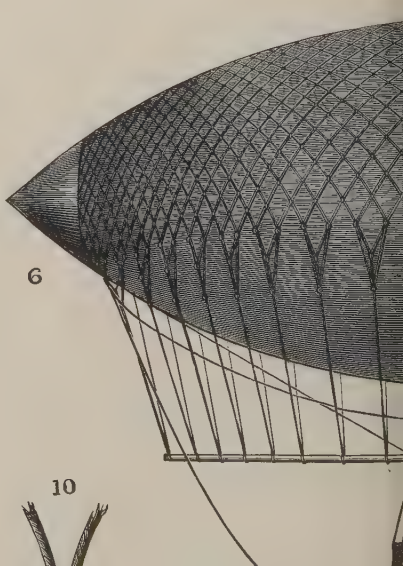

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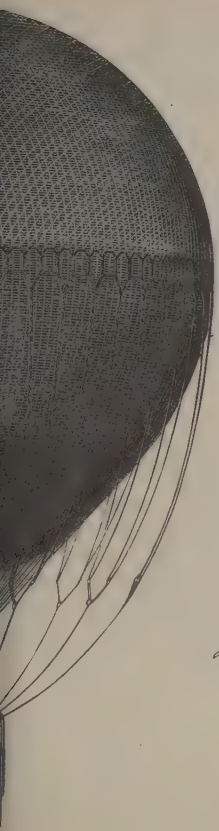
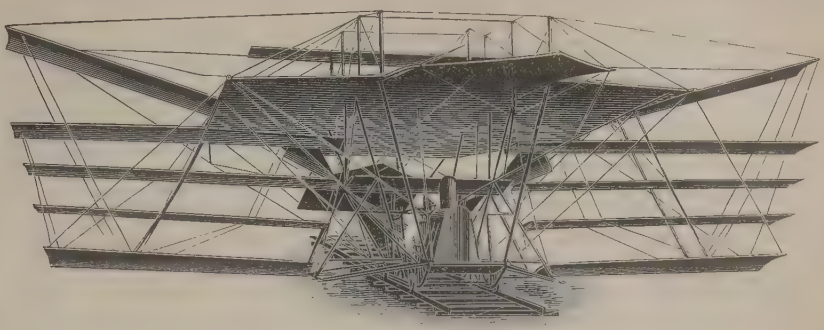
Fig. 1. Langley's Flying Machine. 2. Chanute's Gliding Machine—off. 3. Chanute's Gliding Machine—stopping. with Motor and Gearing enlarged. 8. Great Captive Balloon used at Paris. 9. Section of Car of same. Scientific Observers and their Instruments. 13. Parachute as it appears when descending.





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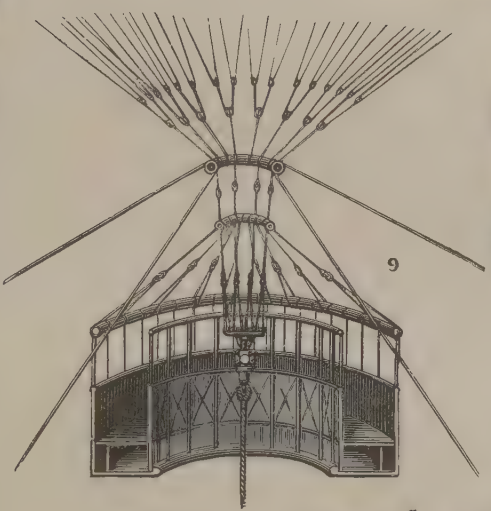

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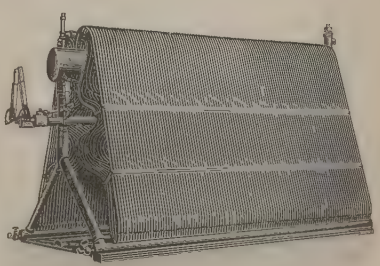

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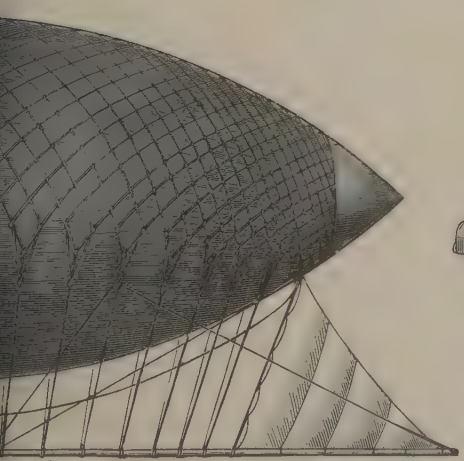

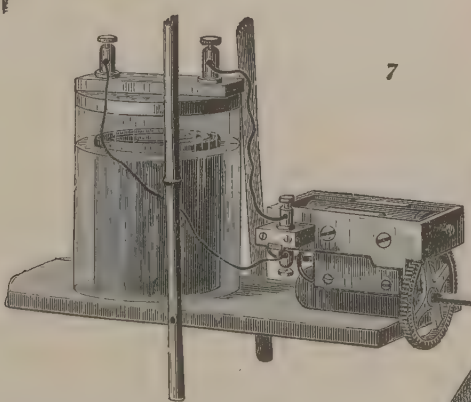

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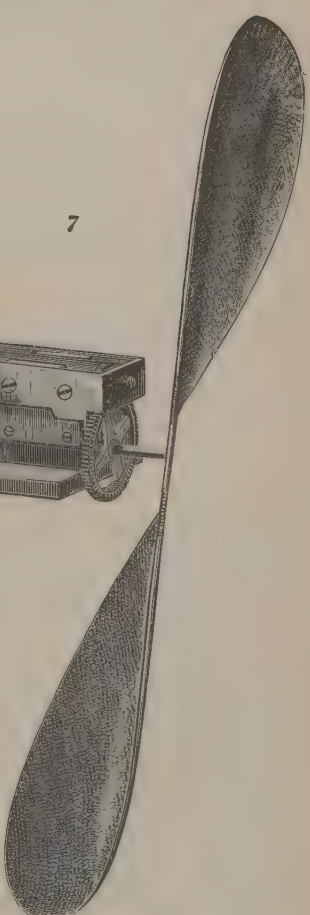

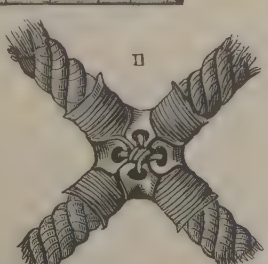

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Flying Machine. 5. The Boiler of the Maxim Machine. 6. Balloon with Electric Motor. 7. Propeller of same,
of ordinary Netting as compared with that adopted in Netting of Captive Balloon. 12. Ordinary Balloon Car, containing

There are numerous varieties of apparatus for manufacturing aërated waters on a large scale. An easily worked portable apparatus, called a gazogène, can now be readily procured in which these waters can be cheaply produced at home. The essential parts of an aërated-water machine are a generator, in which the gas is produced, a vessel containing the water to be impregnated, and an apparatus for forcing the gas into the water. This is sometimes effected by agitating the water to be impregnated by the oscillation of the vessel in which it is contained, sometimes by force-pumps, sometimes by the high pressure of the impregnating gas itself. The quantity of gas with which the water is charged is usually equal to a pressure of five atmospheres. The gas may be generated by the action of carbonate of soda or some other alkali, or sulphuric acid. In the gazogène bicarbonate of soda and tartaric acid are commonly used. The composition of the most common aërated mineral waters consists of 15 grains of crystallized carbonate of soda, or 20 grains of bicarbonate of soda, to each bottle of water.

AËRODYNAMICS, a branch of aërology or the higher mechanics, which treats of the powers and motion of elastic fluids. Aërodynamics is often explained in connection with hydrodynamics.

ÆROE, or ARROE, an island of Denmark, in the Little Belt, with 10,200 inhabitants. It is about 15 miles long by 5 broad, and though hilly is very fertile, and carries on a considerable trade in corn. Its chief town, Æroeskjöbing, stands on the south-east coast. Æroe is, in proportion to its extent, the most populous district of Denmark.

AËROLITES, stones or masses that descend from the air. See METEORIC STONES.

AËRONAUTICS may be defined as the art of navigating the air. Till recently, so little progress had been made in aërial navigation that the state of matters might be called similar to that of navigating the waters at the time when primitive man sat astride of a log, to be drifted about with the varying currents. Ballooning was the only method known of practically travelling any distance through the air, and thus the art of managing a balloon, simple as it is, was the only practical application of aëronautics proper. The term is, however, also applied to the study of the theoretical considerations and the scientific principles on which an apparatus capable of really navigating the air, that is, going in any direction we please, may be based. From the earliest periods of history we hear of repeated attempts of men to emulate the example of the birds, bats, and insects, and fly through the air. Probably had these examples in nature not been ever before him, no man would have thought it possible that such great weights could be lifted into the air by the muscular force contained in their bodies. Indeed the earlier theorists sought to prove that birds must be capable of exerting a force infinitely greater in proportion than that possessed by man and other earth-groping beings. Later scientists have, however, shown that such is not the case, and though most authorities agree in deciding that man by his muscles alone is quite incapable of manipulating any device sufficient to raise his weight into mid-air, yet there are some few who even now contend that such might be possible. We may pass by the many curious legends of flying men, as well as numerous absurd accounts of attempts to fly. These can scarcely assist us in the study. Leonardo da Vinci, the painter, wrote towards the end of the fifteenth century a treatise on the Art of Flying, containing many designs which show much mechanical ability. Francis Lana published a work in Italy in 1670, in which he foreshadowed the invention of the balloon. He proposed constructing four large hollow globes of copper, and exhausting the air from them, and suspending a car to hold a man underneath. Theoretically such a device would rise like a balloon, but practically, in order to make the vessels strong enough to resist the pressure of the air, the construction would have to be far too heavy. Bishop Wilkins, in 1691, also wrote a book dealing with the subject of artificial flight. The discovery of the principle of the balloon altered the aspect of the question. Then it was found that an apparatus, quite unlike anything in nature, could be made which would raise a considerable weight into the air, and which appeared as if it might be capable of being propelled along through the air. It was then thought that aërial navigation would at once become one of the ordinary methods of travel, and the scientific world turned from the thought of imitating the bird and devoted its attention to the gas balloon. Thenceforth those who studied the subject became divided into two schools. One set of theorists and experimenters adhered to apparatus rendered lighter than the air, while another set devoted themselves to devising a machine which would rise by its inherent energy while being heavier than the surrounding medium. We will consider these two principles in turn.

The theory of the ascent of a balloon may be explained as follows. It is caused by the displacement of a given volume of air by a body whose total weight is less than that of the displaced air. To the unscientific mind it may be difficult to grasp the fact that air has weight, but a simple experiment may be made to prove it. Carefully weigh a bottle containing air; exhaust the air from it by means of an air-pump; and on weighing it again it will be found to be lighter. The difference in weight will of course be the weight of that particular volume of air. Under ordinary circumstances (60° F.) air will be found to weigh ·3 grain per cubic inch, or ·076 lb. per cubic foot. But other gases have different weights, and Cavendish, in 1766, first found that hydrogen weighed considerably less—as a matter of fact its specific gravity is ·07 (air being as 1). If we therefore took a vessel containing 1000 cubic feet, the air contained in it, or, what is the same thing, the air displaced by it, would weigh 76 lbs. But if the vessel were filled with hydrogen, the latter would only weigh ·07 of 76 lbs., that is 5·32 lbs. The vessel would therefore be capable of raising about 70 lbs. This fact was well understood by Dr. Black of Edinburgh, who, about 1767, stated in a lecture that 'if a sufficiently thin and light bladder were filled with inflammable air (hydrogen), the bladder, and air in it, would necessarily form a mass lighter than the same bulk of atmospheric air, and which would rise in it'. He tried the experiment, but unfortunately was unable to get a bladder sufficiently light. Mr. Cavallo (who wrote one of the earliest books on Aërostation) tried, early in 1782, inflating soap-bubbles with hydrogen, which successfully mounted to the ceiling. Thus it may he said that the balloon was *nearly* invented in England, when some Frenchmen succeeded in producing the practical article.

But there is another fact to be considered with reference to the weight of air. It is well known that all bodies increase in volume when warmed. If we again take our bottle of air, and, after weighing it, apply heat to it, the volume of air will be increased, and as a consequence some of it will be expelled from the bottle—that which remains will naturally weigh less. That is to say, warm air is lighter than cold. Hence the exact weight of a given volume of air will depend upon its temperature.

So also warm air will ascend, and that is why smoke, which denotes warm air, rises. It occurred to two brothers, Joseph and Etienne Montgolfier, paper-makers, of Annonay in France, that if a volume of smoke could be inclosed in a light envelope, the whole would rise into the air, and they accordingly set to work to try the experiment. Having lighted their fire, and placed over it a huge paper bag to collect the smoke, they were delighted to find their ideas correct, and that the bag ascended. This was in November 1782. Their experiments progressed, and in June 1783 they gave a public demonstration of their great discovery. The value of the invention was at once appreciated, and it was evident that, if made of sufficient size, the paper bag would be capable of raising the weight of a man.

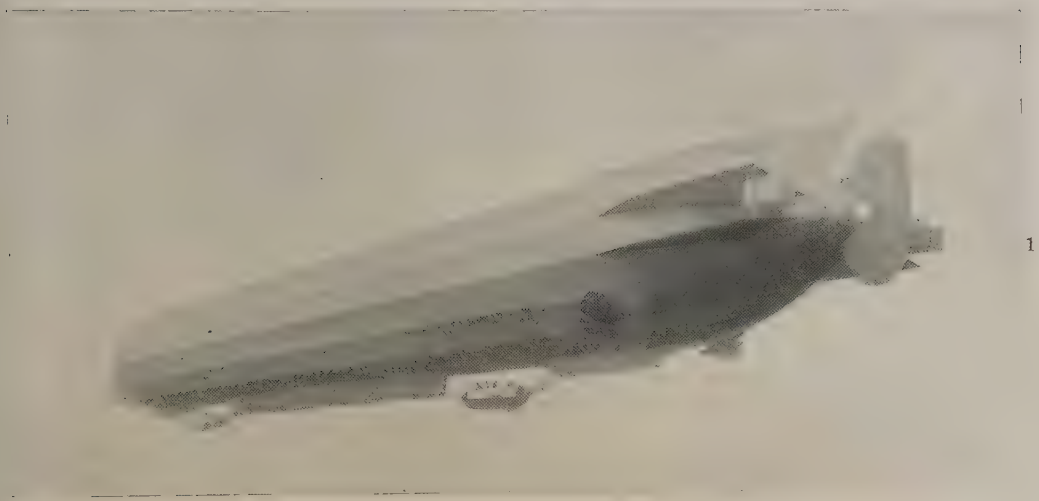
Meanwhile, however, a scientist named Charles, also a Frenchman, thought of another method by which the same result might be attained. Whether or not he had heard of Dr. Black's or Cavallo's experiments, he constructed a large receptacle or balloon of silk and inflated it with hydrogen gas. This made a very successful ascent from Paris on 27th August, 1783. The Montgolfiers then set to work to build a larger balloon, and on 21st Nov., 1783, this rose into the air carrying up two bold aëronauts, the Marquis d'Arlandes and M. Pilâtre de Rozier. They had a very successful trip, and after passing over Paris, made a safe landing some 5 miles off. About six weeks afterwards Prof. Charles and M. Robert made a successful ascent in a hydrogen balloon.

Ballooning then became the rage. Numerous ascents were made, both in France and other countries. Signor Vincent Lunardi, secretary to the Neapolitan Embassy in London, was the first man to ascend in England, though it is said that one James Tytler had previously made a short ascent in Scotland. Lunardi made his first ascent from the Artillery Ground, Finsbury, 15th Sept., 1784, and published a most interesting account of this and other subsequent ascents. Sadler ascended about a month later from Oxford. In January 1785, Blanchard and Dr. Jeffries ascended at Dover with the intention of crossing the Channel. This they succeeded in accomplishing, though it became necessary for them to discharge everything of weight in the car, including provisions and even clothes. They descended, however, safely in the forest of Guines. This feat was at the time naturally looked upon as one of the greatest importance, and Pilâtre de Rozier decided to attempt the passage from the French coast in a new kind of balloon. He came to the conclusion that, by uniting the two principles of aërial ascension, that is, by having both hot air and hydrogen, he would possess an aërostat more buoyant than the ordinary 'Montgolfière', and yet retaining its advantage of being more manageable. He was very unfortunate, however; the balloon cost much more than he had estimated; the wind continued adverse, and the ascent was again and again postponed; but on June 15, 1785, he, accompanied by one Romain, started off. As soon as the balloon had risen to a good height, the gas, as might have been anticipated, caught fire, the apparatus was dashed to earth, and the two first victims to ballooning were extricated from the wreckage.

Such an apparatus, enabling a man to rise readily to such a height as to obtain an extensive bird's-eye view over the surrounding country, naturally soon suggested itself as most applicable to military purposes, and during the wars which were then being conducted it was put to the test. In 1793 the French Government instituted experiments, and a corps of 'aerostiers' was formed. Balloons were made use of during the campaign on the Rhine, at Maubeuge, and at the battle of Fleurus, with much success.

Many interesting balloon journeys were accomplished during the next few years. Blanchard, who may perhaps be considered the first professional aëronaut, made altogether some sixty ascents. Garnerin also made a name for himself, he being the first man to descend from a balloon in a parachute. Gay-Lussac and Biot made, in 1804, some of the first ascents for purely scientific purposes, the former ascending on one occasion to 23,000 feet. He found no alteration in the magnetic force, and the air which he brought down for analysis was found to have the same composition as that at the surface of the earth. Sadler made a number of ascents, during one of which he crossed from Ireland to England. Charles Green made a great many excursions between 1821 and 1850. He was the first to use ordinary coal-gas instead of hydrogen for inflation, the former gas, though considerably heavier, being much cheaper and easier to obtain. Mr. Rush accompanied Green on sixteen occasions for the purpose of making scientific observations. In 1836 Messrs. Hollond, Monk Mason, and Green made a journey from London to Nassau, spending a night in the air. MM. Barral and Bixio in France, and Mr. Welsh in England, made several scientific ascents, but the most numerous, systematic, and best appointed ascents for scientific observation were those of Mr. Glaisher in 1862–66. Twenty-eight ascents were made with Mr. Coxwell as aëronaut, the greatest height attained being estimated at 37,000 feet, or 7 miles. At this great elevation Mr. Glaisher became insensible owing to the rarefaction of the air, and Mr. Coxwell temporarily lost the use of his hands. Many important results were arrived at which were published in Mr. Glaisher's interesting book Travels in the Air. Balloons were employed by the Federals during the civil war in America with considerable success. During the siege of Paris they became a regular means of communication with the outside world. Sixty-four balloons left the city with despatches and with carrier pigeons. In 1878 one of the largest balloons ever constructed was used as a captive balloon at the Paris Exhibition. This contained no less than 882,000 cubic feet of hydrogen, and could take up fifty-two people at a time. M. Hervé, in 1886, made a journey lasting 24½ hours, and M. Mallet, in 1892, is said to have remained in the air for 36 hours. The most remarkable journey ever attempted was that of Herr Andrée, who, with two companions, ascended, on July 11, 1897, from Spitzbergen in a balloon of 170,000 cubic feet, with the object of reaching the North Pole; but nothing is known as to their fate.

The form of the ordinary balloon, or those just spoken of, is usually nearly spherical, since such a shape gives the greatest volume for its surface, or in other words, it requires the smallest amount of material to contain a given volume of gas. At the top is placed the *valve* for letting out gas when required; at the lower end the shape is usually drawn out to form a funnel open at the bottom for the automatic escape of gas when the pressure becomes great. The material of the best balloons used to be silk, varnished with a composition chiefly consisting of boiled linseed-oil, frequently containing other ingredients, such as indiarubber. But cambric is now much more often used, as being cheaper, and quite strong enough for ordinary purposes. Of late years methods have been discovered of sticking together numerous pieces of thin skin, usually the intestines of an ox, known as goldbeater's skin. When these are attached together, and layers added till five to seven or eight layers are formed, the resulting envelope is both strong, light, and very gas-tight. The expense of this process,



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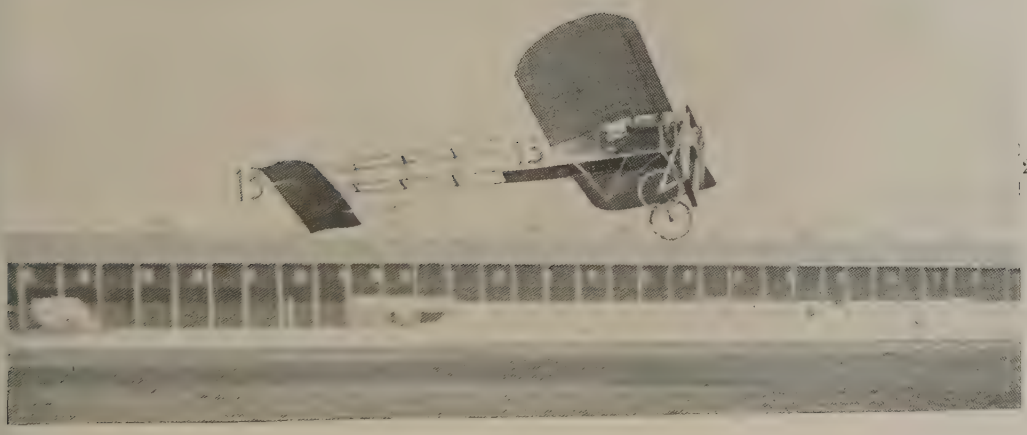

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1, Dirigible Balloon or Airship, with driving machinery and steering apparatus. 2, Blériot Monoplane. 3, Farman Biplane, type of machine with which Paulhan made his flight from London to Manchester, May, 1910, winning prize of £10,000. The term "aviation" refers to the use of machines such as 2 and 3, which are heavier than air. The wheels are used to take a run along the ground and give a start.

however, limits its use to only very special balloons, such as those used for military purposes. In order to bear the weight of the car and passengers, the balloon is covered with a network of string, cords from the lower part of which are connected to a hoop, and from this the basket car is suspended by six or eight ropes. As for the operation of filling the balloon, the balloon is spread out on the ground, the neck being below and the valve on top, and the netting laid on it and fastened round the valve. A tube is connected with the neck, by which the gas is introduced, and bags of sand are placed all round, and hooked on to the netting, to prevent the balloon rising too soon. As the balloon fills out and lifts up the bags, these are one by one hooked to lower meshes of the net; finally the car is attached, and all ballast bags taken off the netting and put in the car. When all is ready, the aëronauts get into the car, and ballast is discharged until the requisite amount of 'lift' is obtained. The valve-line, leading down inside the balloon from the valve to the car, is seen to be right, the grapnel and its cable placed in position, the latter being secured to the hoop. Usually some 60–100 lbs. of sand ballast is taken in small sacks. On being released the balloon ascends to a given height, depending not only on the volume of gas, but upon the temperature and pressure of the air and other minor considerations. When the balloon tends to descend ballast is discharged, which causes it to rise, and when it is desirable to effect a landing the valve-line is pulled and gas let out. When close to the ground the grapnel is lowered, which should catch in some tree or in soft ground, and the balloon thus anchored. The 'guide rope', a long and heavy rope trailing over the ground, the invention of Green, is sometimes used, when the country is such that no serious damage will be caused by its trailing. The principle of this device is that as the balloon tends to rise it must lift more of the rope off the ground, while, when the balloon sinks, it will be relieved of so much weight, and thus the balloon will tend to float at one level above the ground.

Latterly there have been many attempts to steer and propel balloons—to produce a 'dirigible' balloon—and a great amount of success has attended the efforts of some inventors. It is pretty evident that not much could be done in this way by a balloon of the ordinary form as just described, and balloons of special shape—often called distinctively *airships*—have latterly been constructed. M. Giffard was the first (in 1852) to make an elongated balloon to be propelled by a screw. The driving power was derived from a 3-horse-power steam-engine, and the apparatus was estimated to have travelled 5 to 7 miles an hour. Since then many somewhat similar balloons have been constructed. A balloon constructed for the French government in 1884, was of the shape of a fish, over 150 ft. long, and 25 ft. greatest diameter; it had a screw propeller driven by an electric engine, and made several voyages of some miles, returning to its point of departure, the speed being about 14 miles per hour. The names of Count Zeppelin and M. Santos Dumont and others have become well known in connection with navigable balloons. In 1897–99 the former constructed a huge cylindrical airship of great length, with paraboloid ends, divided into a number of separate chambers filled with hydrogen gas, these being enclosed in an outer air balloon, the whole being braced and made rigid by an aluminium framework. The means of propulsion were screws driven by petroleum motors, but the success of this great structure was only partial. In 1909, however, the same aëronaut accomplished a flight lasting for thirty-eight hours and extending to some 900 miles including evolutions. The Zeppelin No. 4, destroyed in 1908, was 480 ft. long, 48 in diameter, had sixteen separate gas-holders contained in an aluminium sixteen-sided framework covered with fabric, carried two cars attached to the framework placed below it, and was propelled by two 110-horse-power motors. A similar airship (Zeppelin 7) was wrecked in 1910. Airships have received much attention from the military authorities in Germany, France, and latterly in Britain, where several succesful airships have been built for the army.

We have now to speak of the other general principle of rising in or navigating the air, that is, by means of apparatus heavier than the surrounding medium; this mode of flying being now known as *aviation* (from L. *avis*, a bird).

We need scarcely go into that interesting study, the flight of birds. All we will here say is that they afford a living proof of the possibility, given sufficient motive power applied to a suitable contrivance, of causing a weight to rise in the air and progress through it in any required direction. Before discussing the more elaborate plans that have been suggested for actual artificial flight it may be well to consider certain other appliances heavier than air, which bear upon the subject. First we may note the *parachute*, a contrivance somewhat resembling a huge umbrella, and presenting a large surface to the air in such a way that any weight, as that of a man, for instance, suspended from it is prevented from falling very rapidly owing to the resistance it offers to the air. The idea is of early origin, and the contrivance itself was first used in its present form by Garnerin, but though often experimented with, it is usually only employed as a spectacular attraction. The same principle has also been utilized in what have now become known as '*soaring* or *gliding machines*'. Lilienthal in Germany was one of the first to regularly experiment with such. Pilcher in England, and Chanute and others in America, have since made similar contrivances, the general idea of which is an apparatus more or less like a huge bird with outstretched wings, beneath which the man attaches himself, and, on springing off the top of an eminence, descends through the air. By this means many valuable lessons may be learnt with regard to the practical behaviour of a flying machine in mid-air. Another appliance which must be included under this head is the *kite*. As usually understood, this is taken to mean a plane surface of paper or cloth stretched on a framework, so poised as to present an inclined surface to the action of the wind while being retained by a string, so that the wind blowing against its under side tends to lift it upwards and keep it suspended. Kites have been known from very early times, and are to be seen in almost all parts of the world, especially in the East. They have long been employed for scientific purposes and otherwise. Major Baden-Powell, in 1894, using an enormous kite, 36 ft. high, raised a basket containing a man. Later on he used a varying number of smaller kites in combination, and made frequent ascents up to 100 ft. Hargrave in Australia invented a new form of kite, known as the 'box' kite, with a series of which he raised himself off the ground, and this experiment was repeated by others. Major Baden-Powell also raised a man during calm by towing the kite by horses attached to the string, thus proving practically the possibility of lifting a man in the air with an *aëroplane* (as described below), provided sufficient propulsive power can be applied.

The various proposals put forward for accomplishing the navigation of the air, apart from balloons, may be divided into three classes: (1) flapping wings, (2) vertically lifting screw-propellers, (3) aëroplanes

propelled horizontally by screw propellers, the latter acting in the air in the same way as an ordinary screw propeller in the water. Many suggested machines include two or more of these principles.

As regards the first system, though it is the only method which nature presents to us, it is the one least adopted by inventors. The reciprocal motion is usually more difficult to apply in mechanics than a rotatory one. Archytas (400 B.C.) is said to have made an artificial bird of wood, which flew by flapping its wings, but no further details have been handed down concerning it. M. Pénaud in recent times made several small models, actuated by india-rubber under torsion, which flew successfully. Major Moore made some elaborate models with wings like those of a flying-fox, driven by electricity. But the problem of artificial flight has not been much furthered by such attempts. The machines belonging to this class have been designated *ornithopters* (Greek *ornis, ornithos,* a bird, *pteron,* a wing).

The second general method of propulsion, that of screw-propellers mounted on vertical axes, has in several instances been successfully applied to small models (known by the name of *helicopters*). Most people are familiar with the toy butterflies actuated by a few strands of twisted indiarubber, which may be made to flutter up to the ceiling. Another toy on this principle consists of a small piece of tin formed like a screw, and set in motion by spinning it with a string like a top. A larger appliance of the same kind is used for inanimate pigeon shooting. Sir J. Cayley made various experiments with such models early last century, and Mr. Phillips made a little machine, worked by a peculiar steam-engine, to rise to a great height in 1842. Although many designs have been put forward for a larger machine on this principle, nothing much has been accomplished.

The third principle, that of the *aëroplane*, analogous to that of the kite, is the one most usually adopted by modern inventors. A simple aëroplane consists of a large flat surface arranged to float nearly horizontally on the air, but with the front edge very slightly raised, so that, on being propelled rapidly along, it receives the pressure of the air on its under side, which thus acts more or less in opposition to the force of gravity. We know that a kite will rise in the air if drawn along by its string; hence, if instead of drawing it along we apply a propeller to drive it through the air, it ought to ascend in the same manner. Henson, in 1843, was probably the first to devise such a contrivance. He proposed making a huge machine with fixed outstretched wings to be driven by two screw-propellers, but only constructed, in conjunction with another experimenter, Stringfellow, a large and not very successful model. Mr. Phillips in 1884 made a machine consisting of a number of very narrow superposed aëroplanes, which was driven by a steam-engine on a circular track, and is said to have just risen off the ground. It weighed in all over 300 lbs. Mr. Phillips was one of the first to point out that an 'aërocurve', or surface slightly arched, is more efficient than one perfectly flat, and this principle is adopted in recent machines. One of the most determined attempts to solve this great problem was conducted by the well-known inventor, Sir Hiram S. Maxim. After some years of careful experiment he constructed in 1891 a huge machine with main, and several subsidiary, aëroplanes. He applied a beautifully-constructed steam-engine of 300 horse-power to rotate two large screws of 17 ft. 10 in. diameter. This apparatus was driven many times along a railway track on wheels, and on one occasion rose into the air, but fell and was damaged. A fairly successful attempt at a flying-machine was Prof. Langley's so-called 'aërodrome', which, however, was hardly more than a model. This machine had two rigid pairs of wings about 12 ft. in width, between which were placed the screw-propellers, 3 ft. in diameter, driven by a steam-engine giving a force of 1 to 1½ horse-power.

Wonderful advances have been made within the last few years in constructing flying-machines on the aëroplane principle—more especially with 'monoplanes', or those with a single main lifting surface, and 'biplanes', those with an upper and a lower lifting surface. A monoplane may be compared to a bird gliding with outspread motionless wings. It may consist of two 'wings' or lifting surfaces, in the same plane or nearly so. A biplane is intended to give similar power without so great a width or spread. 'Triplanes' or 'multiplanes' have also been used. A tail, rudder, and other appliances form a part of the machines. The position of the centre of gravity and the question of stability are of high importance. One great difficulty is in contending with the winds or constant variations in the aerial currents. And many adventurous aviators have already lost their lives. Such apparatus require to be made as strong and also as light as possible. The framework of the planes or wings is mostly made of light tough wood, such as ash or hickory, some kind of fabric being stretched over with an upper and a lower surface, both as smooth as can be made. Propellers are driven by small internal-combustion motors, either in front or rear. The whole apparatus is provided with runners or wheels, on which it is started along the ground till it acquires sufficient velocity to aid it to rise. Among the names of aviators, or those using aëroplanes, are the brothers Wright, Blériot, Farman, Paulhan. On July 25, 1909, Blériot made a famous flight from Calais to Dover. A month later Farman made a flight of 112 miles at Rheims. On April 27–28, Paulhan flew from London to Manchester, 150 miles, with one halt by the way, winning the prize of £10,000 given by the *Daily Mail* newspaper. His time was slightly over four hours. Much longer flights have since been made.

On the accompanying plate fig. 1 gives a view of Langley's machine. Figs. 2 and 3 exhibit Chanute's gliding machine with the aëronaut supported by it in the air. Fig. 4 shows Maxim's flying-machine with a short portion of the railway track made use of in the starting of the machine. The boiler is shown on an enlarged scale in the next figure. The weight, with water, casing, and all appliances, was only 1200 lbs. Gasoline was used as fuel, being burned in the form of vapour. Fig. 6 represents a balloon of somewhat peculiar shape, with an electric motor attached, the motor or propeller being shown on a larger scale in the next figure. It was exhibited in the Paris exhibition of 1881. Fig. 8 is a representation of a balloon of the ordinary form, one of the largest ever constructed, already referred to as used at Paris. The car (fig. 9) accommodated 52 persons, and had an opening in the centre through which passed the rope connecting the balloon with the winding engines on the ground. The netting was specially constructed, the ordinary type of knot (fig. 10) being discarded, and the connections being of the type shown in fig. 11. Fig. 12 shows a balloon car of the ordinary kind containing two scientific observers accompanied by their instruments. The ordinary type of parachute is shown in fig. 13.

AËROSTATIC PRESS, a simple contrivance for rendering the pressure of the atmosphere available for extracting the colouring matter from dye-woods and similar purposes. A horizontal partition divides the machine into two parts. The lower part is connected with an air-pump, by means of which the air

can be withdrawn from it. The matter from which the substance is to be extracted is laid upon the partition, which is perforated, and a perforated cover is placed over it. Upon this the liquid intended to form the extract is poured, and, the pump being worked, is forced through the pores of the partition to the lower vessel, carrying the colour or other soluble matter with it.

AËROSTATICS, that branch of physical science which treats of the weight, pressure, and equilibrium of air and other elastic fluids, and of the equilibrium of bodies sustained in them. It is sometimes used instead of *aëronautics*. See AIR, AIR-PUMP, BAROMETER, PNEUMATICS, &c.

ÆSCHINES, a celebrated Athenian orator, the rival and opponent of Demosthenes, was born in Attica, in the demus of Cothocidæ, 389 B.C. His father, according to Demosthenes, was the slave of a schoolmaster, and his mother is described as a dancer and a prostitute, who pursued her vocation after her marriage in her own house. As Æschines himself and his brothers held honourable positions in the Athenian commonwealth, one of his brothers having for three years been one of the ten Athenian generals, it is probable that these accounts of the meanness of his origin have been exaggerated by party malice. His father was poor, and kept a school, in which Æschines in his youth performed menial offices not deemed honourable in a free-born Athenian. According to Demosthenes, his father was named Tromes, but Æschines, in order to make him appear of better family, called him Atrometus. After assisting in his father's school Æschines was employed as a professional gymnast. He underwent the usual period of military service, was employed as a scribe by the statesmen Aristophon and Eubulus, went upon the stage as an actor, and served with distinction in several important campaigns, particularly those of Mantineia and Tamynæ. After the last-named battle he was sent to carry home the news of the victory, and obtained a crown as the reward of his valour. He had already begun to acquire reputation as a public speaker, and was at first a zealous opponent of the growing power of Macedon. In 348 he was sent to the Peloponnesus to secure a union of the Greeks against Philip, but failing in his mission he became convinced of its impracticability. He was afterwards employed to negotiate peace with Philip, and continued thereafter steadfastly to support the Macedonian alliance. Though openly accused of bribery, he was for a long period employed and trusted by the Athenians, among whom he headed the Macedonian party, but having failed in B.C. 330 in a prosecution against Ctesiphon for proposing to bestow a crown of gold upon Demosthenes, on which occasion Demosthenes made his celebrated oration On the Crown, he withdrew from Athens. Although this accusation had been delayed till the Macedonian party was predominant, Æschines did not obtain the number of votes (one-fifth) necessary to free him from a fine of 3000 drachmas for bringing a false accusation. He afterwards employed himself for several years teaching rhetoric in Ionia and Caria. After the death of Alexander (B.C. 323) he went to Rhodes, and established a school of eloquence. He died at Samos, B.C. 314. Three of the orations of Æschines are extant—one made against Timarchus, who accused him after his second embassy to Philip of having been bribed; another oration on the embassy; and a third against Ctesiphon. He is said to have read this oration to his pupils at Rhodes, and on their expressing surprise at his failure he replied, 'You would cease to be astonished if you had heard Demosthenes'. There are also twelve letters ascribed to Æschines, but they are not considered genuine. The earliest edition of the orations was by Aldus Manutius in his Collectio Rhetorum Græcorum (Venice, 1513). There are various modern editions. See also Jebb's Attic Orators.

ÆSCHYLUS, the first in order of time of the three great tragic poets of Greece, was born at Eleusis, in Attica, in B.C. 525. Euphorion, his father, was probably connected with the mysteries of Demeter, and he is said himself to have been initiated. In B.C. 499 he made his first appearance as a competitor for the prize of tragedy, but was not successful. Before attaining his first triumph he had to appear as an actor on a grander scene. He was present, and highly distinguished himself, at the battles of Marathon, Artemisium, Salamis, and Platæa. He must have gained as a poet by his experience in this momentous struggle, and probably too his fame as a warrior would help to recommend his compositions as a poet to his countrymen. His first dramatic victory was achieved in B.C. 484. The names of the pieces which composed his trilogy at this time are not known. The Persæ (Persians), the earliest of his extant pieces, formed part of a trilogy which gained the prize in B.C. 472. Altogether he is reputed to have composed seventy tragedies and gained thirteen triumphs. In the satirical pieces which accompanied the trilogy of tragedies he is said also to have been a master. Only seven of his tragedies are extant. They are—The Persians (remarkable as being founded on contemporary events), The Seven against Thebes, The Suppliants, Prometheus Bound, Agamemnon, The Choephori, and The Eumenides. The last three form the trilogy of the Oresteia (so named as being based on the story of Orestes), the only complete Greek trilogy we possess. It was represented in B.C. 458, between which date and that of The Persians the others were brought out; but, according to a suggestion of Böckh, the representation of the Oresteia in B.C. 458 was a repetition in the absence of the poet. In B.C. 468 he was defeated by Sophocles, and is said to have retired through mortification at this defeat to the court of Hiero, king of Syracuse. Of the fact of his residence at Syracuse at this time there appears to be no doubt, and without ascribing his retirement to mere jealousy, there are other reasons for associating it with his defeat. Æschylus belonged to the old aristocratic party, which had long been on the decline. His rival, Sophocles, whose first appearance as a dramatist had thus been honoured with a triumph, was favoured by the democratic party, Cimon himself being one of the judges. The decline of his party might thus render Athens an uncongenial residence to Æschylus, and indispose him for an arduous contest in which he did not feel that justice was done to his claims. During his residence at Syracuse he composed many pieces, in which he not only selected local subjects, but used words unintelligible to the Athenians. Unless Böckh's theory is received it must be supposed that Æschylus returned to Athens for the representation of his Oresteia. There is a story that he was accused before the Areopagus for impiety either in representing the Eumenides on the stage or in divulging the mysteries of Demeter; and it is to the period of this representation that the accusation is usually referred. If Æschylus came to Athens he must soon have returned to Sicily, where he died at Gela in 456. A tomb was erected to him, with an epitaph by himself, in which he speaks of himself as an exile from Athens, and refers to his part in the battle of Marathon, but not to his writings. Of the manner of his death an improbable story is told, namely, that an eagle, mistaking his bald head for a stone, let fall a tortoise on it to break the shell, and thus killed him.

Æschylus was in a sense the creator of the Greek tragedy, the stage up till his time being occupied with comparatively feeble productions. His style, as is common with early poets, was grand, sublime, and full of energy, though sometimes erring in excessive splendour of diction and imagery. Longinus, the celebrated Greek critic, complains of it as being often harsh and overstrained. His plays have little or no plot, and in personal portraiture he does not represent the subtle complexities of human character, which belong to a later development of art, but the bold outlines of strength and daring which pertain to the conception of gods and heroes. A fatalistic tendency dominates his views of the unseen, and by making men the sport of superior beings supplies abundant material for tragedy. An ethical principle of retribution is not, however, wholly lost sight of. The practice of contending for the prize with a trilogy of plays was established before his time, but he was the first to reduce the trilogy to a unity by linking together three distinct but associated subjects, each of which formed the theme of a play complete in itself yet related to the others.

Æschylus was a great improver of the stage as well as of the drama. He introduced a second actor upon the scene, and was thus the founder of true dramatic dialogue, to which he subordinated the chorus, which had formerly been the principal part. At a subsequent period he followed the example of Sophocles in introducing a third actor. The dialogue he introduced was measured and formal, and without the license of broken lines. This gave it a distant and stately character agreeable to the kind of superhuman heroes which it suited the genius of Æschylus to put upon the stage. To make the appearance of his personages suitable to their character, he introduced the thick-soled cothurnus or buskin to raise the stature of the actors, and he gave them dresses appropriate to the parts they had to play. He himself sometimes acted in his own plays. He also made use of the scene-painter's services, and Agatharchus is said to have painted for him the first scenes drawn according to the laws of linear perspective. From the testimony of Aristotle, however, it seems to be doubtful whether scene-painting was actually introduced by Æschylus or Sophocles. After its introduction it would no doubt be used by both. He carefully trained the dancers to represent incidents in the play by appropriate action, and he removed from the stage scenes of violence and blood.

By a special decree of the Athenian people a chorus was provided at the public expense for any one who wished to produce any work of Æschylus a second time. After his death his sons Euphorion and Bion, and his nephew Philocles, gained triumphs with works of his over Sophocles and Euripides, and thus was established a tragic school of Æschylus, which continued to flourish for more than a century. The first edition of Æschylus was printed at Venice in 1518. The best of the earlier editions was that of Stanley (London, 1663). The best recent editions are those of Ahrens (Paris, 1877), Wecklein (Berlin, 1884), and F. A. Paley (in the Bibliotheca Classica). There are English poetical translations by Potter, Blackie, Plumptre, Campbell, and Swanwick, and prose translations by Paley and W. Headlam.

ÆSCULAPIUS (in Greek *Asklēpios*), the god of medicine among the ancient Greeks and Romans, In Homer Æsculapius appears to be merely a man, the god of medicine being Pæëon. The deification of Æsculapius was probably, however, founded on the Homeric story. Some writers call him a son of Apollo and Arsinoe, daughter of Leucippus; others of Apollo and Coronis, daughter of Phlegyas. Apollo brought his son to Chiron, who instructed him in medicine and hunting. In the former he acquired a high degree of skill, so as to surpass even the fame of his teacher. He not only prevented the death of the living, but even recalled the dead to life. Zeus, however, induced by the complaints of his brother Pluto, slew Æsculapius with a thunderbolt. After his death he received divine honours. In particular he was worshipped at Epidaurus, in Peloponnesus, where a temple with a grove was dedicated to him. The sick who visited his temple had to spend one or more nights in the sanctuary, after which the remedies to be used were revealed in a dream. Those who were cured offered a sacrifice to Æsculapius, commonly a cock. From the accurate register here kept of the most remarkable diseases and their remedies the greatest physicians gathered experience and knowledge. Thence his worship spread over all Greece, and finally to Rome. On one occasion after the plague had raged there for three years ambassadors were sent to Æsculapius at Epidaurus, by the advice of the oracle of Delphi. They had hardly appeared before the god when a serpent crept from beneath his image, and hastened directly to the Roman ship. This serpent, which was thought to be Æsculapius himself, was carried with great solemnity to Rome, upon which the plague ceased. Æsculapius had two sons, Machaon and Podalirius, who were called Asclepiadæ, and during the Trojan war made themselves famous as heroes and physicians. His descendants, or at least a priestly caste possessing a knowledge of medicine, were also called Asclepiadæ. His daughters were Hygeia, Iaso, Panacea, and Ægle, the first of whom was worshipped as the goddess of health. Æsculapius is represented with a large beard, holding a knotty staff, round which is entwined a serpent, the symbol of convalescence. Near him stands the cock, the symbol of watchfulness. He is sometimes crowned with the laurel of Apollo. Sometimes his little son Telesphorus is represented beside him, with a cap upon his head, wrapped up in a cloak. Sometimes Æsculapius is represented under the figure of a serpent only.

ÆSOP, the Greek fabulist, is said to have been a contemporary of Crœsus and Solon, and thus probably lived about the middle of the sixth century B.C. So little is known of his life that his existence has been called in question. He is said to have been originally a slave, and to have received his freedom from a Samian master, Iadmon. He then visited the court of Crœsus, and is also said to have visited Pisistratus at Athens. Finally he was sent by Crœsus to Delphi to distribute to each of the citizens four minæ a piece. For some reason he refused to distribute the money, whereupon the Delphians, enraged, threw him from a precipice, and killed him. A compensation was paid to Iadmon, the grandson of his late master. The Athenians had a statue in his honour erected by Lysippus. No works of Æsop are extant, and it is doubtful whether he wrote any. Bentley inclined to the supposition that his fables were delivered verbally and perpetuated by repetition. The variations with which they are quoted by ancient writers corroborates this view. The Æsopian fable is a species of allegory in which morals are drawn from natural occurrences, and especially from the real or imaginary actions of animals, while in order to give life and force to the narrative, animals, and even inanimate objects, are endowed with speech and human reason. When this type of fable was invented it would inevitably be employed by others besides the originator, and the fables of the inventor himself, especially if delivered orally, would be certain to be embellished in repetition. A collection or accumulation of fables of the Æsopian type was known and esteemed in the classic age of Greek literature. Socrates attempted

to versify some of them. They are noticed by Aristophanes, and Plato also speaks of them with approval. They were versified, among others, by Babrius, a Greek poet of considerable merit, some of whose fables are still extant. Phædrus turned into Latin verse the Æsopian fables current in his day, with additions and embellishments of his own. In modern times several spurious collections of Æsop's fables have been published, all of which appear to contain fragments from Babrius. Some of them contain a life of Æsop, who appears to be confounded with an oriental fabulist, Lokman, celebrated by Arabian writers, and who is represented as an ugly black slave. Whether from this circumstance, or with a view of setting off his wisdom, Æsop is represented in this biography, from which the popular notion of him is derived, as ugly and deformed, but this representation has no historical basis. Some of the fables bear traces of an oriental origin, others are modern.

ÆSTHETICS is the name given to the branch of philosophy or of science which is concerned with that class of emotions, or with those attributes, real or apparent, of objects generally comprehended under the term beauty, and other related expressions. The term æsthetics first received this application from Baumgarten, a German philosopher, who was the first modern writer to treat systematically on this subject. Kant uses the word æsthetics (*aisthetikos*, perceivable by the senses) in a broader etymological sense, treating in his *transcendental æsthetic* of the *a priori* principles of sensuous knowledge. There are, as indicated, two modes of treating æsthetics, scientifically or empirically, by collection and collation of the objects or associations by which the æsthetical emotions are excited, and philosophically by analysis and determination of the cause or source and mode of the emotions. Neither of these modes is independent of the other; but the scientific mode, from the multitude of details it involves, is little amenable to summary treatment, and in form at least we shall be compelled to limit ourselves to the other.

Æsthetics, like every other branch of philosophy, has suffered from the conflict of first principles which has continually impeded the development of details; but it has also profited by this conflict, which has itself brought out facts which might otherwise have been hid. Space will not permit us to give a historical summary, and we must confine ourselves to the briefest indications of the views of the leading thinkers.

Socrates, according to Xenophon, regarded the beautiful as coincident with the good, and both as resolvable into the useful. Plato, in accordance with his idealistic theory, held the existence of an absolute beauty, which is the ground of beauty in all things. He also asserted the intimate union of the good, the beautiful, and the true. Aristotle, whose contributions to æsthetics are of the highest value, treated of them in much more detail than Plato, but chiefly from the scientific or critical point of view. In his Poetics he declares poetry to be a more serious and philosophical matter than philosophy itself. In his treatises on Poetry and Rhetoric he lays down a theory of art, and establishes principles of beauty. His philosophical views were in many respects opposed to those of Plato. He does not admit an absolute conception of the beautiful; but he distinguishes beauty from the good, the useful, the fit, and the necessary. He resolves beauty into certain elements, as order, symmetry, definiteness, and a certain magnitude, which appears to be relative to the perceptive capacity. A distinction of beauty, according to him, is the absence of lust or desire in the pleasure it excites. Beauty has no utilitarian or ethical object; the aim of art is merely to give immediate pleasure; its essence is imitation; the chief objects of imitation in poetry and music are passions, dispositions, and actions. The essence of poetry consists in this imitation, and not in form. The end of tragedy, he says, is to effect a purification of pity and fear by means of these passions themselves. He also speaks of a purifying effect of music in quieting wilder forms of excitement. As this seems a contradiction of his negation of an ethical end in æsthetics it has been disputed whether this purification is ethical or æsthetical. Plotinus agrees with Plato, and disagrees with Aristotle, in holding that beauty may subsist in single and simple objects, and consequently in restoring the absolute conception of beauty. He differs from Plato and Aristotle in raising art above nature. When the artist has *logoi* (the equivalent in the system of Plotinus of the ideas in that of Plato) for his models his creations may be more beautiful than natural objects. Baumgarten's treatment of æsthetics is essentially Platonic. He made the division of philosophy into logic, ethics, and æsthetics; the first dealing with knowledge, the second with action (will and desire), the third with æsthetics. Where Baumgarten fails of a Platonic standard is in limiting æsthetics to the conceptions derived from the senses, and in making them consist in confused or obscure conceptions, in contradistinction to logical knowledge, which consists in clear conceptions. Kant defines beauty in reference to his four categories, quantity, quality, relation, and modality. In accordance with the subjective character of his system he denies an absolute conception of beauty, but his detailed treatment of the subject is inconsistent with the denial. Thus he attributes a beauty to single colours and tones, not on any plea of complexity, but on the ground of purity. He holds also that the highest meaning of beauty is to symbolize moral good, and arbitrarily attaches moral characters to the seven primary colours. The value of art is mediate, and the beauty of art is inferior to that of nature. He classifies the arts according as they express the (subjective?) æsthetic idea. The treatment of beauty in the systems of Schelling and Hegel can with difficulty be made comprehensible without a detailed reference to the principles of these remarkable speculations. Idealistic systems, which, to say the least, it is difficult to distinguish from pantheism, while it is impossible not to find a beauty and even sublimity in the boldness of their developments, they may be described from an outside point of view as exaggerations of Platonism, in which human consciousness is made the exhaustive measure of universal being. The concord of subject and object, which with Schelling constitutes the absolute, is seen in artistic conception within the limits of the ego, and a feeling of infinite satisfaction accompanies this perfect perception by intelligence of its real self. Art accordingly is higher than philosophy, and the beauty of art is superior to the beauty of nature. Schelling's views of art are not clearly developed into particular criticism. In tragedy he finds a conflict of liberty in the subject with objective necessity. In art, according to Hegel, the absolute is immediately present to sensuous perception. With him, as with Schlegel, it is the highest revelation of beauty, and superior to nature. The beautiful is the shining of the idea (the Hegelian idea, or absolute notion into which all existence is resolvable) through a sensuous medium. Its essence accordingly is in appearance, and in this it differs from the true. Its complement is religion, which embodies the certainty of the idea. Hegel classifies the arts according to the supremacy of form and matter, a classification which appears somewhat superficial, and is very open

to criticism. He treats of beauty in much detail, and where he is not Hegelian he is essentially Platonic. The extravagances of Hegelianism, along with its pantheistic tendencies, become more pronounced in the systems of the followers of Hegel, into which we have not space to enter. English writers on beauty are numerous, but they rarely ascend to the heights of German speculation. Shaftesbury adopted the notion that beauty is perceived by a special internal sense; in which he was followed by Hutcheson, who held that beauty existed only in the perceiving mind, and not in the object. Numerous English writers, among whom the principal are Alison and Jeffrey, have supported the theory that the source of beauty is to be found in association—a theory analogous to that which places morality in sympathy. The ability of its supporters gave this view a temporary popularity, but its baselessness has been effectively exposed by successive critics. Dugald Stewart attempted to show that there is no common quality in the beautiful beyond that of producing a certain refined pleasure; and Bain agrees with this criticism, but endeavours to restrict the beautiful within a group of emotions chiefly excited by association or combination of simpler elementary feelings. Herbert Spencer avails himself of a hint supplied by Schiller, which he makes subservient to the theory of evolution. He makes beauty consist in the play (sport) of the higher powers of perception and emotion, defined as an activity not directly subservient to any processes conducive to life, but being gratifications sought for themselves alone. He classifies æsthetic pleasures according to the complexity of the emotions excited, or the number of powers duly exercised; and he attributes the depth and apparent vagueness of musical emotions to associations with vocal tones built up during vast ages. Among numerous writers who have made valuable contributions to the scientific discussion of æsthetics may be mentioned Winckelmann, Lessing, Jean Paul Richter, the Schlegels, Gervinus, Helmholtz, and Ruskin.

The theory of Plato affords, we believe, the true basis both of philosophical apprehension and of scientific investigation of the beautiful. What is meant when it is said that there is no common quality in what is recognized as beauty beyond the excitement of a pleasurable emotion? It is not pretended that all pleasurable emotions are comprehended in the notion of beauty; the mere excitement of pleasure is not then sufficient to distinguish the notion. Is the use of the term then a mistake, and does it imply nothing more than the arbitrary grouping together of some pleasurable emotions to the exclusion of others? We have the most conclusive psychological evidence in the structure of all languages that this is not the case, and that there is some notion, simple or complex, subjective or objective, requiring this term to express it. If then we attempt to distinguish between pleasurable emotions, and to group them as emotions of beauty or emotions not of beauty, we must either suppose our emotions to be self-excited, or we must assume a corresponding difference in the exciting cause. We have thus got both an objective and a subjective beauty and it remains to inquire into the nature of the object, whether real or phenomenal, simple or complex, by which the notion of beauty is excited. Association cannot be an original cause of the emotion, for association as such, and without regard to the nature of the association, can excite no definite emotion such as that of pleasure. If the notion of beauty then is actually excited by association, as it undoubtedly is, it remains to be inquired by what association, and by what elements of the association? Nor can the explanation of Aristotle and other philosophers be received, that beauty is merely a recognition of harmony, proportion, symmetry, and such modes in complex objects, for it is as undoubted that there is a self-beauty, the beauty of a straight line in being straight, of a circle in being round, or of blueness in being blue, as that there is a beauty of harmony and proportion. Lastly, we cannot limit beauty to the objects of the senses: all that is perceived by intelligence, whether in the forms or processes of matter, or in the states or operations of mind, is capable of exciting the emotion of beauty. There is then no common category in which the beautiful can be included except the beautiful. It is not the useful, or the good, or the true, the great or small, the high or low, but the beautiful. But Plato has also shown that our ideas, though not resolvable into each other, are mutually dependent and related. They are united in concrete thought and apprehension, and they form in their totality a whole which constitutes the oneness of intelligence. If beauty then cannot be resolved into other notions, its relations to and combinations with these notions can be traced, and this constitutes its philosophical definition. Our knowledge is indeed too limited to enable us to trace all the relations of ideas which are infinite, but a just use of psychology enables us to apprehend in their simplest form even the highest verities, and Plato, in associating in one triad beauty, goodness, and truth, has expressed the highest relation and evolved the highest knowledge attainable of them. The psychological evidence of this union lies within the range of experience, and its generalization is the legitimate operation of reason. To a limited intelligence goodness and truth (or reality) seem often wide apart, but every intelligence must apprehend the desirableness of their union, and occasionally witness practical exemplifications more or less perfect of it. If uniting such partial realizations we assume that to a perfect intelligence truth and goodness would be in perfect unity, the contemplation of this union will excite in us the highest emotion of beauty. This then may be regarded as both the type and the exhaustive realization of the notion of beauty. This trinity has, as indicated also by Baumgarten, a relation to the distribution or natural operation of our faculties. We have reason to apprehend truth, imagination to perceive beauty, and conscience to recognize goodness. It is one mind which operates in all these, but the modes of operation are different, and in the operation of the perceiving faculty will be found the explanation of much that distinguishes our notions of beauty. Imagination as a mental faculty must not be understood as a mere power of reproducing objects of sense in the form of pictorial images. It is the mental power by which we apprehend and combine at will all the elements directly presented to our consciousness, whether from external observation or internal experience. It, as well as reason, is operative, but it differs from reason both in its mode of operation and in its end. Instead of the slowly elaborate process by which reason searches out the true relations of its objects, it seeks by the readiest process objects of immediate contemplation on which it can dwell with satisfaction, and accordingly selects for combination those elements which present to it the most immediate affinities. In its constructive data it is as comprehensive as reason, but in its processes it is less sure. It even forms hypotheses, that is, semblances of reasons, but it leaves reason to verify them. Hence the reason why the perception of the beautiful has been assigned to an inner sense. Hence also the reason why the apprehension of beauty separates itself from the apprehension of truth and of goodness. The apprehension of beauty is always the apprehension of some perfection, of some identification of the good in the real, but in order to produce

the emotion of beauty this identification must be manifest. This it is, and this alone apparently, which associates beauty with the work of imagination rather than with the work of reason, and makes the former the special faculty of beauty. The processes of reason are slow, and their results remain long imperfect; thus there is no immediate realization of the perfection of truth attained by them; but when some final discovery completes a chain of reasoning, and a whole truth stands revealed, there is an immediate perception of goodness in the completed truth, and the emotion of beauty is at once evoked. The work of imagination is subject to the review of reason, but as reason and imagination work on the same fundamental principles, it is the application of these principles alone which reason can review. Particular manifestations of beauty are thus capable of analysis, and we may resolve the elements of the most complex manifestations into two, self-beauty and beauty of combination. The first exists when the simple type or idea is realized in the example, when a straight line is straight, a circle round, a colour or a sound pure. When a type is suggested by simulation, on the contrary, but so imperfectly realized that the defect is apparent, the result is ugliness. It thus needs no metaphysics to distinguish beauty from its opposite. In combination beauty is given when perfect types are combined according to laws of symmetry, proportion, and design. Every single curve, for example, has a particular law, and that curve is beautiful when produced according to its law; but when a variety of curves are combined according to some law of symmetry in one outline, there is, besides the self-beauty of the several curves, a beauty in the observance of the law of combination, and in this complex beauty of outline, besides the manifested beauty of form, there may be suggested beauties of suppressed continuations. So with combinations of sound and colour and other more complex combinations, as in the forms of animal and vegetable life. Two related laws of beauty in combination appear to be the production of the greatest variety with the least expenditure of means, and the repetition under slight modifications of similar forms. The latter from the comparisons it suggests has a highly educative effect on the perceptive faculties. Thus all the canons of beauty are absolute, but as these canons are applicable only to the elements, whether of self-beauty or of combination, and as we are ignorant of the laws which determine the number and variety of the more complex combinations, which we learn to know only by observation and comparison, principles of criticism only can be formed, and no absolute standard of taste for common empirical observation. Diversities of opinion are thus easily accounted for. The existence of beauty in the object is distinct from its perception, and in a complex object each observer will only perceive those beauties which the capacity and training of his own faculties enable him to perceive. Even the demonstration to reason of the observance of a law of beauty will not help a defective capacity. The instrumentality of our senses in interpreting to us the beauties of nature demands particular attention. Beauty in an object implies relation of the object to mind in which the canons of beauty exist, but not surely to the perceiving mind only, but also to the conceiving or creating mind. The perception of beauty thus establishes a community between the perceiving and the creating mind. It is an evidence of the validity of the information we derive from those operations of our senses which are deemed most arbitrary. It is the stamp of the Creator on the instruments of our faculties.

It is easily possible for art within a narrow range to excel nature, for while nature supplies our types, she rarely carries out in any individual example all the details of typical excellence variously presented. The whole causes of these deviations of nature from her own standards it is impossible to assign, but observation shows that ethical causes have a place among them, and the best reason of men has always inclined to give them a larger place than actually appears. In this also art imitates nature, but in this wider sphere to suppose that art could excel nature would be to assume the superiority of man to the Author of nature. There is thus no ethical indifference for art. To limit it to the mechanical imitation of nature, or the mere selection and combination of æsthetical types without an ethical purpose, would be to place it below the level of reason, and to contradict instead of imitating nature. In assigning a purifying effect to art Aristotle spoke truly as a critic and historian, and to denude this purification of an ethical significance would be to lower his authority as a witness, but not to alter the fact. No canon of criticism is more frequently repeated at the present day than that of Aristotle, that art is without ethical end. This criticism, however, is not true to nature. Art cannot cease to be æsthetical in order to be ethical. It must always deal with the perceptive, but within its own province it is subject to its own ethical code, and it has besides affinities with the general ends of ethics which cannot be ignored with impunity. The pleasure it affords must always be pure, and it may also be instructive.

The sublime, the ludicrous, and other sentiments referred to the æsthetic sense are, we believe, not independent notions, but complex sentiments allied to the notion of the beautiful; but their discussion involves much controversy on which we have not space to enter.

ÆSTIVATION, a botanical term applied to the arrangement of the parts of a flower in the flower-bud previous to the opening of the bud. Different names have been given to the varieties of æstivation in different plants. When the parts of a whorl are placed in a circle in one plane the æstivation is circular. Circular æstivation is valvate when the parts are placed contiguously without overlapping; when the edges of the parts are turned inwards it is induplicate, when outwards reduplicate; when the axis of the parts is turned so that each overlaps the next on one side, and is overlapped by the following on the other, the æstivation is twisted or contorted. When the æstivation is spiral, the parts partially overlapping each other, it is said to be imbricate; when the parts envelop each other completely it is called convolute. Quincunxial æstivation is an imbricated æstivation consisting of five parts, two external and two internal, the fifth part being partially covered by one of the external, and partially covering one of the internal parts. The æstivation in papilionaceous flowers is called vexillary when the vexillum or upper petal is folded over the others; when the carina or keel (lower petal) is similarly developed it is called carinal. The different whorls of a flower have often different æstivations.

ÆTHER. See INTERSTELLAR ÆTHER.

ÆTHER, in chemistry. See ETHER.

ÆTHIOPIA. See ETHIOPIA.

ÆTHUSA, a genus of umbelliferous plants, one species of which, the *A. Cynapium*, or fool's parsley, resembles common parsley in size and appearance, but is easily distinguished from it by its heavy unpleasant smell, and long, narrow, pendulous, floral leaves. It is poisonous, and has sometimes when mistaken for parsley proved fatal.

ÆTNA, MOUNT, the greatest volcano in Europe, a lofty mountain situated in the east of the province of Catania in Sicily. Ætna was called Atuna by

the Phœnicians, Aitnes by the Greeks. The Sicilian name is Mongibello, compounded of the Arabian *gibel*, a mountain, and the Italian *mon*, contraction of *monte*, the prefix being added when the Arab term had come to be taken for a proper name. The mountain has a circumference of more than 100 miles, and the whole north-east part of Sicily as far south as the plain of Catania is included in the district immediately under its influence. The height of the mountain, as barometrically measured by Sir J. Herschel, is 10,874 feet. As it ascends immediately from the sea, this gives a climbing height equal to that of Mont Blanc from the valley of Chamouni. The sea bathes its eastern extremity, and two rivers, the Alcantara and the Simeto, rising near the same point on its north-western flank, flow round its northern and southern bases, reaching the sea at the northern and southern extremities of the province. The Ætna district is divided into three regions, called the *Piemontese*, the *Selvata*, and the *Nevata*, or the region at the foot of the mountain, the wooded region, and the region of snow; the last again is divided into melting and perpetual. Ætna thus presents the variety of climates common to high mountains in lower latitudes. A more or less distinct margin of cliff separates the mountain proper from the surrounding plain. Above this marginal cliff extends a platform rising on all sides at an insensible angle of 2° or 3°. Rising from this as a socket the general mass of the mountain appears in the form of an obtuse depressed cone. The slopes have a pretty regular ascent of 7° to 8° up to the central gibbous mound, the Mongibello proper, which is ascended by an alternation of slopes and terraces to the summit. The last is a small inclined plane called the Piano del Lago, in the centre of which is the terminal cone containing the grand crater. Ætna is formed of a series of superimposed mountains. The terminal volcano is surrounded by a magnificent array of greater and smaller hollow cones, all of volcanic origin, and nearly 100 of which are considerable. They are scattered over its flanks from the limit of the cultivated region to the Piano del Lago. With one exception they are all of ancient origin, but they are continually being modified, united, or destroyed, by the activity of the subterranean forces, by which also the size, form, and structure of the central cone itself is being incessantly modified. Futara or Monte Rosso arose from the eruption of 1669, when all the materials which rose into the air from two mouths in active eruption for two months united to form the new cone. The wooded region comprises the trees common to central Europe, the chestnut, oak, beech, pine, birch, and witch-elm. The different aspects of the mountain present an astonishing variety of natural features. The wooded region on the north above the high valley of the Alcantara is interspersed with glades of fine pasture and cultivated fields shaded with walnuts. Blocks of lava yellow with lichens serve to indicate the nature of the soil on which this treacherous beauty is displayed. On the western side the eruptive phenomena appear in the nakedness of their desolation. The mountain here presents the aspect of an enormous dome surmounted by a pyramid covered with snow, ashes, and scoriæ, the base of the dome surrounded at elevations of 600 to 1200 feet with cones of debris. These, mostly of modern origin, mark the openings from which the currents of lava formerly flowed. On the south the slope is more gentle and graceful. The numerous cones of eruption, among which is Monte Rosso, present a great variety of form and grouping, and rich cultivated fields appear between the currents of lava. The eastern side as seen from the sea presents the most majestic aspect. The outer cliff, composed of alternate layers of red scoria and blue-black lava, rises for about 300 feet, with the roots of cactus and the tendrils of climbing plants clinging to their fissures. Above the cliff rises an undulating plain covered with orchards, which are interspersed with numerous towns and villages. Further up vines, olives, and chestnuts clothe the declivities of the great cone of eruption, while high above these rises the naked mass of the mountain. On this side the huge abyss known as the Val del Bove, surrounded on three sides by perpendicular walls, opens towards the sea. From the summit the view presents an incomparable panorama, embracing the whole of Sicily, the Ægadian Islands, the Lipari Islands, Malta, and Calabria. Above the region of snow which seems from a distance to cover the summit, the plain inclosing the crater is reached, which is continually covered with sulphurous clouds or agitated by violent winds. The mouth of the crater is several miles in extent, irregular in form, with projecting and re-entering angles, lateral cavities, and deep fissures.

Frequent eruptions of Ætna before the arrival of the Greeks in Sicily are referred to by Diodorus Siculus. Hesiod, Æschylus, and Pindar, among the early Greek writers, make mention of Ætna, while Homer is silent regarding it. Three eruptions are mentioned by Thucydides as having taken place between the arrival of the Greeks and the period of which he wrote; the first of an early date not mentioned, the second about B.C. 475, also mentioned by Æschylus and Pindar; the third about B.C. 425. The dates of the principal eruptions subsequently recorded are B.C. 396, 140, 135, 126, 121, 49, 44, 38, 32, A.D. 70, 251, 420, 812, 1169, 1181, 1285, 1329, 1408, 1444, 1446, 1536, 1537, 1603, 1607, 1610, 1614, 1619, 1639, 1669, 1682, 1688, 1689, 1702, 1755, 1766, 1780, 1781, 1787, 1811, 1832, 1838, 1842, 1852, 1865, 1868, 1874, and 1879. That of 1169 overwhelmed Catania, and buried 15,000 persons in the ruins. In 1669 the lava spread over the country for forty days, and 10,000 persons are estimated to have perished. The town of Bronte was destroyed in 1832. Other eruptions have been specially destructive. The population of the district of Ætna is at present about 300,000. An eruption is ordinarily preceded by promonitory symptoms of longer or shorter duration. Towards the end of June previous to the eruption of 1787 the cloud of smoke on the summit increased and took occasionally the colour of fire. In the first days of July an opening was observed on the borders of the crater at the north-west, and from Catania a fire appeared on the summit like the disk of the full moon seen on the horizon. A flow of lava took place for two days spreading over a couple of miles. On the night of 9th to 10th July an aurora borealis was seen twice at intervals for a period of half-an-hour each time, in the direction subsequently taken by the eruption. On the 13th thick black smoke reappeared, and flashes of fire became more frequent and intense. On the 16th extreme heat was experienced and the fire from the mountain was partially concealed by the thick smoke. The noise of the mountain and the audible vibration of the whole base announced the imminence of the eruption. On the following morning it was in full activity and presented a picture equally splendid and terrible. A column of fire of every variety of colour rose from the crater to a height of 3000 feet, alternately darkened with prodigious quantities of water and sand, and again flaming forth with increased brilliancy. The upper part of the column, black and smoky, was pierced by flashes of electric fire and jets of inflamed scoriæ, at its base a broad current of lava issuing from the crater flowed to the south-west. These phenomena, together with the trembling of the earth, continued for two days and all was over. The matter

ejected consisted chiefly of saline matters in crystals more or less pure and earths.

ÆTOLIA, a division of ancient Greece, bounded in the time of Strabo on the north and north-west by the Athamanes, Dolopes, and Dryopes, separated on the west by the Achelous from Acarnania, washed by the Corinthian Gulf on the south, and having Locris and Doris on the east. Besides the Achelous the only river of any size was the Evenus. Between them lies a fertile plain, separated by the range called Aracynthus on the north from another extensive plain, containing two large lakes in communication with each other. The rest of the country is crossed in all directions by rugged mountains, covered with forests and intersected by ravines. The plains produced abundance of corn and excellent pasture, and the Ætolian horses were famous. The mountain slopes produced good wine and oil. Lions, bears, and other wild beasts infested the mountains in ancient times. Calydon, Pleuron, and Thermum were the chief towns. In heroic times Ætolia was celebrated as the scene of the hunt of the Calydonian boar (see CALYDON and MELEAGER); and the Ætolians took part in the Trojan war. The name was traditionally derived from Ætolus, son of Endymion, who settled in the country with a colony of Epeans from Peloponnesus. The inhabitants are little heard of in Greek history till the Peloponnesian war, at which time they were notorious among the Greeks for the rudeness of their manners. They were divided into a number of independent tribes, living by plunder and the chase. They subsequently formed the confederacy called the Ætolian League, which, after lending material assistance in the expulsion of the Gauls from Greece (279 B.C.), became with the Macedonians and the Achæans one of the chief powers in the country. The league was at the height of its power in 220 B.C. After fighting against the Achæans and Macedonians, latterly in conjunction with the Romans, they deserted their allies on perceiving that their freedom was in danger from them. They then joined Antiochus of Syria, and on his defeat (189) they came under the Roman power, and were ultimately incorporated in the province of Achaia. Ætolia, in conjunction with Acarnania (which see), now forms a nomarchy of the Kingdom of Greece.

AFFIDAVIT, a written statement of facts upon oath or affirmation. Affidavits are generally made use of when evidence is to be laid before a judge or a court, while evidence brought before a jury is delivered orally. The person making the affidavit signs his name at the bottom of it, and swears that the statements contained in it are true. The affidavit may be sworn to in open court, or before a magistrate or other duly qualified person. Numerous rules of practice in relation to affidavit are laid down in the schedules to the Supreme Court of Judicature Act, 1875. As a general rule all evidence is to be given *viva voce*, but particular facts may be proved by affidavit either by agreement of the parties or by order of the court, provided that no such order shall be made if the witness can be had and is required for cross-examination. Affidavits are to be confined to such facts as the witness is able of his own knowledge to prove, but statements of belief are admitted on interlocutory motions. When by consent of the parties evidence is taken by affidavit fourteen days each are allowed to plaintiff and defendant for filing their affidavits, and seven days to the plaintiff for reply. Within fourteen days after the time of filing affidavits in reply, either party may serve notice on the other that any person whose affidavit has been filed must be produced in court for examination and unless produced his affidavit may not be received.

AFFILIATION. See PARENT AND CHILD.

AFFINITY, in chemistry, may be defined as the force by which unlike kinds of matter combine so intimately that the properties of the constituents are lost, and a compound with new properties is produced. This change of properties distinguishes chemical affinity from the forces of cohesion or adhesion, since the bodies united by both these forces retain their respective qualities unchanged. Of the force itself we know little or nothing. Chemical affinity differs from mechanical mixture or solution inasmuch as substances combine chemically in certain fixed proportions by weight, and in these proportions only. Chemical combination is also attended with changes in the thermal state of the bodies uniting together. The laws that regulate it will be discussed in the article CHEMISTRY—Laws of Combination; a few peculiarities in its manifestations may be here noted. The two bodies must be in contact, or at an insensible distance. Hence it is all but indispensable that one of them should be a fluid. Among many agents that powerfully influence affinity, the most important are heat, light, and electricity, each of which in various circumstances may produce or dissolve chemical union. Potash and sand combine under a red heat, and form glass; carbonic acid and lime, united at common temperatures in marble or limestone, are separated by a red heat. Chlorine and nitrogen may be mixed without union in the dark, in daylight they unite gradually, in direct sunlight they unite at once. An electric spark passed through a mixture of oxygen and hydrogen combines them into water; an electric current passed through water decomposes it into oxygen and hydrogen. Photography and electro-metallurgy are founded on the chemical action of light and electricity; the agency of heat is universally employed in chemistry and metallurgy. The changes produced by chemical combination in the properties of the elements employed are endlessly varied. Colour, taste, and smell are changed, destroyed, or created; harmless elements produce strong poisons, strong poisons produce harmless compounds.

AFFINITY, in law, is that degree of connection which subsists between one of two married persons and the blood relations of the other. It is no real kindred. A person cannot, by legal succession, receive an inheritance from a relation by affinity; neither does it extend to the nearest relations of husband and wife so as to create a mutual relation between them. The degrees of affinity are computed in the same way as those of consanguinity or blood. By the Jewish law marriage was prohibited within certain degrees. Nearly the same limitations are adopted into the laws of Europe and America. All legal impediments arising from affinity cease upon the death of the husband or wife, excepting those which relate to the marriage of the survivor. The table of forbidden degrees of affinity is, by the ecclesiastical law of England, commanded to be hung up in all churches. The Roman Church speaks of *spiritual affinity*, which is contracted by the sacraments of baptism and confirmation; thus in consequence of the spiritual affinity between them a god-father may not marry his god-daughter without a dispensation.

AFFIRMATION signifies, in one sense, the solemn declaration of Quakers and members of other religious communities, in confirmation of their testimony in courts of law, or of their statements on other occasions on which the sanction of an oath is required of other persons. The form for Quakers and Moravians is, 'I do solemnly, sincerely, and truly declare and affirm.' Affirmation is now allowed to be substituted for an oath in all cases where a person refuses to take an oath from conscientious motives, if the judge is satisfied that the motives are conscientious. False affirmation is subjected to the same penalties as perjury.

AFFRIQUE, SAINT, a town of France, in the department of Aveyron, in a fine valley watered by the Sorgue. It is a somewhat antiquated place. The inhabitants are employed chiefly in woollen and leather manufactures, and trading in wool and Roquefort cheese. Pop. (1901), 5200.

AFGHANISTAN, the land of the Afghans, a country in Asia, of a quadrangular shape, lying chiefly between lat. 30° and 38° N.; lon. 61° and 73° E. It is bounded on the east mainly by India and Indian frontier tribes, south by Beloochistan, west by Persia, and north by the Russian Transcaspian territory, Bokhara, and the Russian Pamir territory. The length from east to west is about 560, the breadth about 450 miles. The boundaries have recently been all defined, and the area is about 210,000 square miles. The population is estimated at between 4,000,000 and 5,000,000. Afghanistan consists chiefly of lofty, bare, uninhabited table-lands, ranges of snow-covered mountains, and deep ravines and valleys. Many of the last are well watered and very fertile, but about four-fifths of the whole surface is rocky, mountainous, and unproductive. The surface on the north-east is covered with lofty ranges belonging to the Hindu Kush, whose heights are often 18,000 and sometimes exceed 20,000 feet. The loftiest passes are above 12,000 feet, and the road often passes along the base of mural precipices rising from 2000 to 3000 feet. The whole north-eastern portion of the country has a general elevation of over 6000 feet; but towards the south-west, in which direction the principal mountain chains of the interior run, the country sinks down to not more than 1600 feet. The principal avenues of communication between Afghanistan and India are the famous Kyber Pass, by which the river Cabul enters the Panjab; the Gomul Pass, also leading to the Panjab; and the Bolan Pass on the south, through which the route passes to Sind. Of the rivers, mostly in the centre of the country, the largest is the Helmund, which flows in a south-westerly direction more than 400 miles, till it enters the Hamoon or Seistan swamp, previous to which, however, its water is almost all drawn off by canals for irrigation. It receives the Arghandab, a considerable stream. Next in importance are the Cabul in the north-east, the Hari Rud in the north-west. The only lake worth mention (the Hamoon being almost entirely in Persia) is that called Ab-Istada, a shallow sheet of water about 12 miles in diameter, situated towards the east of the country, at the height of about 7000 feet. The climate is extremely cold in the higher, and intensely hot in the lower regions. On the whole, however, it is salubrious, yet diseases are more common than we might expect. The most common trees are pines, oaks, the wild olive, cypress, birch, walnut, and holly. Many indigo-yielding plants grow spontaneously on offsets of the Hindu Kush, and asafœtida is common. In the plains the mulberry, tamarisk, acacia, date-palm, willow, plane, and poplar are found; and fine fruits, in the greatest variety and abundance, grow wild. The cultivable land, a very small proportion of the whole area, is under indifferent management. In many parts two harvests are annually reaped. The principal crops are wheat, forming the staple food of the people; barley, given to horses; pease and beans, rice, maize, and several of the grains of Hindustan. Other crops are tobacco, madder, some sugar-cane, and cotton. The more important domestic animals are the camel and dromedary, the horse, ass, and mule, the ox, and sheep with large fine fleeces and enormous fat tails; of wild animals there are the tiger, bears, leopards, wolves, jackal, hyæna, foxes, &c. The minerals include all the more valuable metals, particularly iron, which along with lead is about the only metal worked. The manufactures are unimportant, but the trade is extensive and employs above 24,000 camels. The chief exports are wool, horses, silk, carpets, rosaries, fruits, madder, &c. A considerable amount of wool is forwarded to Karachi for export. The chief political divisions are Cabul, Jalalabad, Ghazni, Kandahar, Herat, and Afghan Turkestan. The chief towns are Cabul, Kandahar, Ghazni, and Herat. The inhabitants belong to different races, but the Afghans proper form the great mass of the people. These call themselves Pushtaneh or Puktaneh, 'Afghans' being the Persian name. They are an Iranic race, and are divided into a number of tribes, among which the Duranis and Ghilzais are the most important, the latter being the strongest of all the tribes. A tradition, evidently modern and legendary, gives them an Israelitish origin. The Afghans are bold, hardy, and warlike, fond of freedom and resolute in maintaining it, but of a restless, turbulent temper, and much given to plunder. Their language is distinct from the Persian, though it contains a great number of Persian words, and is written like the Persian with the Arabic characters. In religion the Afghans are Mohammedans of the Sunnite sect. Other races in Afghanistan are the Hazareh, a Mongol race living chiefly in the north-west; the Tajiks, who are a remnant of the aboriginal population, and are scattered over the country; and the Hindkis, an Indian race living in the east.

Of the early history of Afghanistan little is known—a circumstance the less to be regretted that its interest commences only with modern times. The collective name of the country itself is of modern and external origin, not being used by the Afghans themselves. In 1738 it was conquered by the Persians under Nadir Shah. In 1747 he was murdered, and Ahmed Shah, one of his generals, obtained the sovereignty of Afghanistan, and became the founder of the Durani, the first Afghan dynasty, which lasted about eighty years. At the end of that time Herat was all that remained in the hands of a Durani sovereign, while Dost Mohammed Khan, the ruler of Cabul, had acquired a preponderating influence in the country. He was desirous of gaining the assistance of the British against Persia, but believing that he was meditating treachery against them, they resolved to dethrone him and restore Shah Shuja, a former ruler. In April, 1839, a British army under Sir John Keane entered Afghanistan, and after overcoming some slight resistance entered Cabul, and placed Shah Shuja on the throne. A force of 8000 was left to support the new sovereign, and the rest of the army returned to India. Sir W. Macnaghten remained as envoy at Cabul, with Sir Alexander Burnes as assistant envoy. The Afghans were by no means content with the new state of affairs however. A wide-spread conspiracy was organized, which came to a head on November 2, 1841, when Burnes, Macnaghten, and a number of British officers, besides women and children, were murdered. The other British leaders were disheartened and paralyzed, and a treaty was made with the Afghans, at whose head was Akbar, son of Dost Mohammed, by which the former agreed to withdraw the forces from the country, while the latter were to furnish them with provisions and escort them on their way to Jalalabad. On the 6th January, 1842, the British left Cabul and began their most disastrous retreat. The cold was intense, they had almost no food—for the treacherous Afghans did not fulfil their promises—and day after day they were assailed by bodies of the enemy. By the 13th, 26,000 persons, among whom were many camp followers, women and children, were destroyed. Some were preserved as prisoners, but only one man, Dr. Brydon, reached

SIERRA LEONE
English Miles
Bullom
Sierra Leone River
C. Sierra Leone
Quia
ATLANTIC OCEAN
Yawry Bay
ATLANTIC O
ST HELENA
(South Atlantic Ocean)
Sugarloaf Pt.
Flagstaff
Barn Pt.
The Barn
Turks Cap B.
Dead Wood
Scraggy Pt.
Prosperous B.
Bay Pt.
Saddle Pt.
King & Queen
Drygutt B.
Gill Pt.
George
Deep Valley B.
Long Range
Powell B.
Powell Pt.
Whitehill Pt.
Sandy Bay
Lots Wife Beach
Castle Rock Pt.
Frightus Pt.
Speery Pt.
Manatee B.
Old Father Pt.
Old Joan Pt.
Bird I.
West Pt.
Tripe B.
Thompson B.
Egg I.
Bennet Pt.
Horse Pasture Pt.
Long Ledge
Goat-pound Pt.
Lemon Valley B.
Ladder Hill
James Bay
Munden Pt.
Rupert's Bay
Rupert's Pt.
Ladder Hill Pt.
Banks Val.
Barn Hill
Dead Wood Val.
Scraggy Val.
Prosperous Bay Plain
Flagstaff Hill
Stone-top Val.
Stone-top Pt.
Rough Rock
Lots Wife
Broad Val.
Church Yard.
Horse Pasture Val.
Lemon Valley
High Knoll
Barn Hill
Barn Pt.
Turks Cap B.
Dead Wood
Scraggy Pt.
Prosperous B.
Bay Pt.
Saddle Pt.
King & Queen
Drygutt B.
Gill Pt.
George
Deep Valley B.
Long Range
Powell B.
Powell Pt.
Whitehill Pt.
Sandy Bay
Lots Wife Beach
Castle Rock Pt.
Frightus Pt.
Speery Pt.
Manatee B.
Old Father Pt.
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Bird I.
West Pt.
Tripe B.
Thompson B.
Egg I.
Bennet Pt.
Horse Pasture Pt.
Long Ledge
Goat-pound Pt.
Lemon Valley B.
Ladder Hill Pt.
James Bay
Munden Pt.
Rupert's Bay
Rupert's Pt.
Banks Val.
Barn Hill
Dead Wood Val.
Scraggy Val.
Prosperous Bay Plain
Flagstaff Hill
Stone-top Val.
Stone-top Pt.
Rough Rock
Lots Wife
Broad Val.
Church Yard.
Horse Pasture Val.
Lemon Valley
High Knoll
Barn Hill
Scale of Miles
0 1 2 3 4
5°45'
16°
15°45'
ASCENSION
(South Atlantic Ocean)
English Bay
North Pt.
Porpoise Pt.
Pyramid Pt.
Rough Lava Rock
Extinct Crater
Hummock Pt.
Georgetown
Green Hill
Boatswain-bird I.
Course of water-pipe
Green Mount.
Payne Pt.
Mt. Arthur Pt.
Portland Pt.
Rock
Rough Lava
Unicorn Pt.
Pillar Bay
S. Pyramid
South Pt.
7°55' S. Lat.
Scale of Miles
0 1 2 3 4
14°20' W. Lon.
14°20' W. Lon.
15
10
5
0
5
10

WEST AFRICA
BY J. BARTHOLOMEW, F.R.G.S.
English Miles
0 100 200 300
Railways open
Do constructing or proposed
Slave Coast
BIGHT OF BENIN
GULF OF GUINEA
Mouths of the Niger
BIGHT OF BIAFRA
Prince's I. (Port.)
St. Thomas (Port.)
Fernando Po (Spanish)
RIO MUNI (Spanish)
FRENCH CONGO
Francesville
Libreville
Loango
Cabinda
Boma
Banana
R. Congo
Makoko
Makaka
Mayumba
Ngomi
Ngovi
Iguela
Capotal
Sette Camma
Nyanga
Mayumba B.
Cuango
Mambi
Konkuati
Chilungati
Kuilu
Massabi
Landana
CONGO
Mangonga
Lubuma
Mukimbi
Loango
Stephanie L.
Ogowe
Ngunie
Ngomi
Ngoni
Igumba
Andele
Ndendo
Ngoko
Sangaranga
Yasaratsha
Lopes R.
C. Lopez
Kamarangoe
R. Mixias
R. Fernand Vaz
Anno Bom (Spanish)
Turtle I.
Adams I.
Corisco I.
Corisco B.
R. Gabun
Cape St. Catherine
Cape St. John
Elobe I.
C. S. Juan
Brothers Is.
Bata R.
Benito
Campo
Kribi
Batanga
Gr. Batanga
Lolodorf
Ebolowa
Akonolinga
Jambonga
Mvul
Bikuku
Jumbang
Ntem
Mvelime
Panavia R.
C. Badgley
Clarence Pk.
St. Isabel
Victoria
Cameroon Mt.
Rio del Rey
Cross R.
Duke Town
Creektown
Calabar
Bonny
Brass
Nun
Akassa
King Georges Town
R. Niger
R. Benue
R. Escravos
R. Forcados
R. Ramos
R. Dodo
R. Pennington
R. Middleton
Sapele
Effurun
Warri
Benin
Benin R.
Asaba
Onitsha
Abutshi
Umuna
Ugata
Emuremura
Bonny R.
Opobo
Bakana
Ikoki
OSHEBA
Ngaundere
Yoko
Tibati
Bafut
Bali
Banyo
Tignere
Mt. Tadim
Nasarawa
Katsena
Akpoma
Ibebe
Lokoja
Kabba
Ilesha
Ibadan
Iwo
Oyo
Ogbomosho
Iseyin
Awaye
Ilorin
Offa
Jebba
Bussa
Rapids
Nikki
Wawa
Garanfin
Kuande
Busy
Dokala
Kuli
Yeku
Kontagora
Bida
Egbon
Egga
Abuja
Kerri
Dutsin Ma
Zuma
Kaduna
Kano
Sokoto
Gando
Sabon Birni
Gudu
Kashia
Badiko
Yakubu
Gombe
Kalam
Jori
Koddokshan
Mt. Kemalle
Marua
Mubi
Segero
Holma Mt.
Binder
Bifara
Imburu
Garua
Adumre
Yola
Mauri
Hamaiya
Bassama
Mt. Taugale
Dikoa
Mamuneri
Alarge
Maidugiri
Kasugoaro
Dora
Gubio
Ujeo
Masna
Kasunda
Birniva
Izzege
Dalio
Marghi
Wandala
Kuka
Ngomu
Koyam
Barmi
Bornu
Lake Chad
Kanem
Bosso
Barrua
Ngigmie
Kufe
Kibbu
Feyo
Tintumma
Atereta
Bir Kor
Oasis Agadem
Mojigo
Agadem
Tergulawen
Kel Geress
Tagama
Itissan
Farak Well
Bedsaram
Belgadafari
Firkasui
Gamrek
Awelimmid
Tanut
Jobeli
Bodhal
Akeruf
Damerghu
Maja
Taghlel
Falanka
Salakh
Tessawa
Gunda
Magaria
Munio
Bune
Mango
Wurni
Surrukau
Borgari
Alaine
Duchi
Dukrausa
Gubei
Maradi
Sinder
Gure
Gediyo
Wishek
Barrua
Bosso
Lake
Tsambe
Dalul Maure
Sirmi
Kasaure
Masanuia
Mashena
Gumel
Gerka
Tsab
Komadugu
Alarge
Mamuneri
Dikoa
Fantiego
Mussaua
Kano
Sokwa
Bebeji
Dutsi
Gubi
Takai
Shard Mealau
Figa
Jori
Kalam
Kasugoaro
Dora
Gubio
Maidugiri
Masna
Kasunda
Birniva
Ujeo
Marghi
Wandala
Izzege
Dalio

Jalalabad with the dismal news. Jalalabad, in which General Sale was stationed with a small force, was soon after besieged by Akbar, but on the approach of General Pollock, who had forced his way through the Kyber Pass with a fresh army from India, the Afghan forces withdrew. After joining his forces with those of General Nott, who had meanwhile maintained himself in Kandahar and had taken Ghazni, General Pollock entered Cabul and soon finished the war, though not without some hard fighting. Dost Mohammed again obtained the throne of Cabul, and acquired extensive power in Afghanistan. He joined with the Sikhs against the British; but in 1855 he made an offensive and defensive alliance with the latter, which he renewed in 1857. He died in 1863, having nominated his son Shere Ali his successor. He entered into friendly relations with the British, and this state of matters continued till 1878, when the Ameer having repulsed a British envoy and refused to receive a British mission (a Russian mission being meantime at his court) war was declared against him, and the British troops entered Afghanistan (Nov. 1878). They met with comparatively little resistance; the Ameer fled to Turkestan, where he soon after died; and his son Yakoob Khan having succeeded him concluded a treaty with the British (at Gandamak, May, 1879), in which a certain extension of the British frontier, the control by Britain of the foreign policy of Afghanistan, and the residence of a British envoy in Cabul, were the chief stipulations. Not long after this settlement, however, the British resident at Cabul, Sir Louis P. Cavagnari, and the other members of the mission, were treacherously attacked and slain by the Afghans, and troops had again to be sent into the country. Cabul was again occupied and Kandahar and Ghazni were also taken; while Yakoob Khan was sent to imprisonment in India. In 1880 Abdur-Rahman, a grandson of Dost Mohammed, was recognized by Britain as Ameer of the country. The occupation of Merv by Russia in 1881, and the subsequent continuous pushing forward of the Cossack outposts towards Herat and the south, now began to be seriously considered by the British as menacing India. After some negotiations between the two governments, it was arranged that an Anglo-Russian commission should be constituted to settle the frontier between Afghanistan and Russian territory. In the meantime, however, the Russian troops were advancing, and in 1885 they reached Penjdeh, where they came into conflict with a body of Afghans. For a time war seemed imminent between Britain and Russia, but it was at last settled that the boundary line extending from the Hari Rud to the Oxus should run so as to exclude Penjdeh, but include Meruchak in Afghanistan, following the Oxus eastward from about Khojah Saleh to Lake Victoria, north of Chitral. The boundary between Afghanistan and British India was long uncertain, but in 1893 an arrangement was come to between the Ameer and Sir Mortimer Durand. The boundary then agreed on was demarcated shortly afterwards and is so drawn as to leave Chitral, Bajaur, Swat, Chilas, and Waziristan to Britain, whilst Afghanistan is given the territories of Asmar, Birmal, and Kafiristan. The Ameer's annual subsidy was also increased from 12 to 18 lacs, and restrictions on the import of arms, &c., were removed. Abdur-Rahman proved himself a vigorous ruler and the steady friend of Britain, and did much under the guidance of Englishmen to civilize his subjects and develop the resources of his country. His second son, Prince Nasrullah Khan, visited Great Britain in 1895 and received many tokens of British friendship. The Ameer died on October 3, 1901, and was peacefully succeeded by his eldest son, Habibullah Khan, who has generally followed in his father's footsteps.

AFIUM-KARA-HISSAR, a city of Asiatic Turkey, 170 miles E.S.E. of Constantinople, with which and with Smyrna it is connected by railway. It is built chiefly of stone, and is a place of considerable commercial activity. The staple manufactures are woollen goods, and there is a trade in opium (*afium*), whence its name. Pop. 20,000.

AFRICA, one of the three great divisions of the Old World, and the third in area of the five continents, lies nearly due south of Europe and south-west of Asia. It is of a compact form, being nearly equal at its extreme points in length and breadth. The northern section of the continent, however, has an average breadth of nearly double the southern. This great change of form arises mostly from the greater projection of the upper part towards the west, and the transition on this side from the broad to the narrow section is effected suddenly by an inward turn of the western coast, which faces south for nearly 20° of longitude, forming the Gulf of Guinea, the greatest indentation of the coast. Africa is united to Asia at its north-east extremity by the Isthmus of Suez, now crossed by a great ship-canal. From this point the coast runs in a west and somewhat northerly direction to the Strait of Gibraltar, the point of greatest proximity to Europe. This northern coast forms the southern shore of the Mediterranean Sea, and brings all the northern countries of Africa into close proximity with the European and Asiatic countries lying contiguous to that great ocean highway, which formed the chief medium of communication between the principal divisions of the ancient world. It presents some considerable indentations, the chief of which is that forming the Gulfs of Cabes and Sidra. From the Isthmus of Suez southward the coast runs in a somewhat easterly direction, parallel to the Asiatic peninsula of Arabia, and between the two lies the long and narrow expanse of the Red Sea. To the south of Arabia the African coast projects considerably to the east, overlapping and again running nearly parallel with the southern coast of Arabia, with which it forms the Strait of Bab-el-Mandeb and Gulf of Aden. After this projection, terminating in Cape Guardafui, the coast trends to the south-west, with comparatively slight undulations until it reaches the southern extremity of the continent. About midway, separated from the mainland by the Mozambique Channel, and at a distance of 250 miles, is the great island of Madagascar. With the exception of those named, the coast of Africa presents no great indentations. The total extent of coast accordingly, considering that the continent is almost entirely surrounded with water, is comparatively small. It is estimated at 16,000 miles, a fifth less than that of Europe. Africa is washed on the west by the Atlantic Ocean, on the south by the Southern Ocean, on the east, below the Gulf of Aden, by the Indian Ocean. The continent at its southern extremity presents a coast-line of nearly 400 miles, exclusive of indentations, to the Southern Ocean. This is what is compendiously known as 'the Cape', first doubled by Bartolomeo Dias and Vasco da Gama. The principal indentations of the southern coast are Algoa Bay and False Bay.

Africa extends from 37° 20′ N. lat. to 34° 51′ S. lat., and the extreme points, Cape Blanco and Cape Agulhas, are nearly 5000 miles apart. From west to east, between Cape Verde, lon. 17° 32′ W., and Cape Guardafui (Jerdaffun), lon. 51° 16′ E., the distance is about 4600 miles. The continental area is estimated at 11,250,000 square miles. The islands belonging to Africa are not numerous, and, except Madagascar

none of them is large. In the Atlantic Ocean there are Madeira, the Canaries, the Cape Verde Islands, the Bissagos, the islands off the coast of Guinea, Fernando Po, St. Thomas, Annobon, &c., Ascension Island, St. Helena, and Tristan d'Acunha; in the Indian Ocean, Sokotra, Zanzibar, Comoro Isles, Madagascar, Mauritius, Réunion, with their dependencies; and some small islands in the Southern Ocean. The total area of the African islands is 239,000 square miles.

General Relief.—Although there are few great elevations or extensive mountain ranges in Africa, the general elevation of the continent is so great that the average height is second only to that of Asia, being about 2000 feet. Over the greater part of Africa the rise from the coast is rapid, and low plains are hardly anywhere to be found. One result of this is that all the great rivers are more or less broken by cataracts.

Northern Africa.—The interior of Africa forms two great divisions nearly corresponding with the external diversity of form already indicated. The northern section has its greatest extension from east to west, the southern from north to south. The northern division lies for the most part above the sixth degree of north latitude, extending from the Atlantic on the west to the Somali coast and the Red Sea on the east. Its principal feature is the Sahara or Great Desert, which is inclosed on the north by the elevated plateau of Barbary and that of Barca, on the east by the Nile valley, on the west by the Atlantic Ocean, and on the south by the Niger and the countries of the Sudan. The northern coast region (plateau of Barbary) is traversed by the Atlas system and its continuations, rising to the height of 13,000 feet or even more. Exclusive of the mountains it has an elevation of from 1500 to 3000 feet. From Barca, where the former level prevails, it descends gradually towards Egypt. For further details of the configuration of this part of the continent see ATLAS, MAROCCO, ALGERIA, TUNIS, TRIPOLI, EGYPT. The character of the desert, though sufficiently inhospitable, is much less uniformly monotonous than till recent researches it was commonly reputed to be. Instead of an undeviating sandy plain irregularly interspersed with speck-like oases, it contains elevated plateaux and even mountains with more or less permanent streams, and habitable valleys which lose themselves in the vast low-lying tracts of sand with which the more elevated regions alternate. The desert itself is furrowed with *wadis* (dry river-beds) radiating in all directions, while under the sand collections of water have been found, which by means of artesian wells have been turned to account by the French in their dependency Algeria. A considerable nomadic population is thinly scattered over the habitable parts of the desert, and in the more favoured regions there are settled communities. (See SAHARA.) To the south of the Sahara, and separating it from the plateau of Southern Africa, a belt of pastoral or steppe country extends across Africa. This region has received the general name of the Sudan, and includes the countries on the Niger, around Lake Chad, and eastwards to the elevated region of Abyssinia.

Southern Africa.—From Lake Chad the country begins to rise till below the tenth degree of north latitude, where the edge of the elevated plateau of high or southern Africa begins. This division of the continent is, as far as known, completely surrounded, at a distance of 50 to 300 miles from the coast (which is usually low but rising inland), by what looks like ranges of mountains varying in breadth and height, but which are really the escarpment of a table-land, or series of table-lands, of considerable elevation and great diversity of surface and direction, having hollows filled with great lakes, rivalling those of America in extent, and terraces over which the rivers break themselves in falls and rapids. The southern division has, like the northern, a desert region—the Kalahari Desert—but it is of small extent compared to the Sahara. In some respects it resembles the Sahara, but possesses more vegetation. The mountains which inclose the southern table-land are mostly much higher on the east than on the west, and the slope of the land and the flow of the principal rivers, with the exception of the Zambezi, is from east to west. The eastern edge of the plateau reaches its highest elevation and greatest extent in the mountainous country of Abyssinia, with heights of 10,000 to 14,000 or 16,000 feet. From this the system extends north in detached ranges or occasional elevations between the valley of the Nile and the Red Sea, with gradually diminishing height to the very delta of the Nile. The eastern edge of the Abyssinian plateau presents a steep unbroken line of 7000 feet in height for several hundred miles. This line of elevation extends southwards towards Lakes Rudolf and Stefanie, and thence in a narrow belt and at a lower average level to the north-east of the Victoria Nyanza; it then proceeds in a southerly direction to Kilimanjaro, beyond which the plateau merges into the Paré Mountains in the neighbourhood of the Pangani river. Immediately to the south of Lake Rudolf, Mt. Nyiro rises to a height of 10,000 feet; Mt. Elgon, to the north-east of Victoria Nyanza, 14,100 feet; Mt. Kenia, 18,370 feet; and Kilimanjaro, 19,600 feet; Mt. Meru, to the west of Kilimanjaro, 15,000 feet. The general level of the plateau between Mt. Kenia and the lakes is from 5000 to 7000 feet. To the west of Victoria Nyanza, between Lakes Albert and Albert Edward, Mt. Ruwenzori rises to a height of 17,000 feet, and the active volcanic Kirunga Mountains, south of Lake Albert Edward, to 13,000 feet. All these mountains are volcanic in origin, and between Kilimanjaro and the lake signs of volcanic activity are still visible. The central plateau reaches its greatest average height, over 4000 feet, in the region embracing lakes Victoria Nyanza, Tanganyika, and Nyasa; it forms a broad belt reaching close to the east coast, and in an equally broad belt extends from Lake Nyasa to the west coast. Above this are numerous detached heights, like the Rubeho Mountains, west of Zanzibar, the Livingstone Mountains around the north of Lake Nyasa, and the Mlanje heights south of that lake; Mt. Mlanje being 9680 feet. South of the Zambezi occur the Mashona and Matoppo highlands, rising in places to from 5000 to 7000 feet. Immediately to the south of the Middle Limpopo a series of mountains begins which, under various names—Zoutpansberg, Libombo, Drakensberg, Compassberg, Schneeberg, &c.—extends along the east and south coast, and north to some distance beyond Cape Town. In Natal these rise to 10,000 and 12,000 feet, and in Cape Colony to 7000 and 8000 feet, the interior plateau averaging about 4000 feet, but falling to a lower level in the Kalahari Desert. Between the Orange River and the Kunene, and the latter river and the Congo, the escarpment continues, rising in places to 6000 and 8000 feet. The general level lowers considerably as the Congo is reached. The low coast region extends some distance into the interior along this part of the west coast, the descent from the interior plateau giving rise to the cataracts which so seriously interrupt navigation on the Lower Congo. On both sides of the Middle Congo extends a considerable area which sinks from the generally high level of the interior to an average of only about 1000 feet. From the Congo and Ca-

meroons (Kameruns) the general level of the coast plateau is broken by the Crystal and other mountains rising to 3000 and 4000 feet, culminating in the Cameroons Peak, a volcanic mountain rising to 13,000 feet. On the south of the Benue, in the Atlantika group, and between the Benue and the Niger, we find a broken mountain group with heights of from 6000 and 10,000 feet; while in the interior north of the Gulf of Guinea there is a broad plateau, beginning at various distances from the coast, extending across the Upper Niger, and rising to 2000 and 3000 feet, with irregular ranges rising at places to from 5000 to 7000 feet. The Kong Mountains, in the region where the Niger has its sources, as a range do not exist. As the Middle Niger is approached the general level lowers to that of the Sahara, while northwards the low coast region extends far into the interior until the Atlas is reached.

Rivers.—The Nile is the only great river of Africa which flows to the Mediterranean. It is now known to receive its waters primarily from the country drained by the great lakes the Victoria Nyanza, the Albert Nyanza, and the Albert Edward Nyanza, and especially from the Victoria Nyanza, which itself receives numerous streams. The Victoria Nile connects the Victoria and the Albert Nyanza, and on leaving the latter the river flows in a winding course, of which the direction is almost due north, without further lake expansion, to the Mediterranean. In descending from the lake elevations (of the Victoria 3900, of the Albert Edward 3200 feet, the latter connected by the Semliki River with the Albert 2300 feet) it makes, both between the lakes and in its subsequent course, numerous falls. Those in Upper Egypt are known as the Cataracts. Between 5° and 10° N. lat., under the name of Bahr-el-Jebel, it receives numerous tributaries, mostly from the country to the south and west, the principal on the left bank being the Bahr-el-Ghazal, on the right the Sobat. After this it takes the name of the White Nile, and receives through the Bahr-el-Azrek and Atbara, or Blue Nile and Black River, the drainage of Abyssinia. The Atbara brings the mud which forms so precious a deposit in Egypt. After this the Nile flows for 1200 miles to the sea without receiving a tributary. Altogether it drains an area of more than 1,000,000 square miles. (See NILE, EGYPT.) The Indian Ocean receives numerous African rivers, most of which are short, being the drainage merely of the external slopes of the escarpment of the interior plateau. Among the most considerable rivers on this coast are the Jub, which is formed by several streams rising in the border slopes near Abyssinia, is navigable with difficulty to Bardera, and enters the ocean at the equator; the Webbe Shebeli, formed by streams rising on the south-east slopes of Abyssinia, and losing itself in the sands on the coast near the mouth of the Jub; the Tana from Mount Kenia discharging at Witu; the Sabaki south of the Tana; the Rufiji or Lufiji; the Rovuma, which flows from the mountains east of Lake Nyasa; the Beira; and the Limpopo or Crocodile River, which enters the ocean north of Delagoa Bay. The only great river flowing from a distant point of the interior which breaks the mountain barrier of the east is the Zambezi, which has its embouchure between the Beira and Rovuma. It is the fourth in size of the continent. It drains a large part of the great tract of pastoral country south of the equatorial region. Several streams coming from the swampy plateau on the borders of Lunda and the Garenganze country unite to form the Zambezi, the principal being the Liba from the south-western edge of the Garenganze country. In its middle course it is joined by the Kafue and Loangwe from the north and the Shire from Lake Nyasa, and by the Chobe and some smaller streams from the south. Below the Chobe are the Victoria Falls, one of the greatest cataracts in the world, from which the river flows in a semicircular course to the ocean, breaking through the Lupata Mountains, and discharging by several mouths, the most navigable of which is the Chinde. The river is navigable by vessels of some size to the Kebrabasa Rapids beyond the Shire, but above that only by boats and canoes. The drainage area of the Zambezi is 514,000 square miles.

Of the Atlantic rivers, the Senegal, Gambia, and Niger have their origin in the mountains near the coast of Senegambia. The Senegal flows in a northerly and westerly direction, its volume varying much according to the season. In the rainy season it is navigable for 500 to 700 miles, in the dry season for about a fourth of that distance. The Gambia takes a winding course to the west, and is navigable for about 400 miles, nearly its whole extent. The greatest of these rivers, the Niger, rising in the inner slope of the same mountains, flows north-east to Timbuctoo, whence it turns first east and afterwards south-east, receiving the Sokoto, to its junction with the Benue, which comes from the mountains south of Lake Chad. The upper part of the Niger is called the Joliba, and is flanked by several great swampy lakes; it afterwards acquires the name of Quorra or Kawara. In the northern part of its course it touches on the great desert. It is navigable for light vessels above Timbuctoo. Between the Sokoto and the Benue it is interrupted by shoals and rocks to below Bussa. From the junction it flows due south to the ocean, where it forms a wide alluvial delta, and enters by a number of mouths, the most distant of which are 200 miles apart. The main channel is called the Nun. The drainage area of the Niger is 810,000 square miles. The Congo, the second in extent of basin and the greatest in volume of the African rivers, flows from different slopes of the same water-partings as the Zambezi. Its identification with the Lualaba, the great stream discovered by Livingstone in the centre of the continent, was established by Stanley in 1876–77, this enterprising traveller having descended the river to the Atlantic from a point in the interior westward of Lake Tanganyika. The Lukuga, the outlet of Tanganyika discovered by Cameron, is a tributary of the Lualaba. The Chambeze, which rises in the mountains between Lakes Nyasa and Tanganyika, is the remotest source of the Congo system. It falls into Lake Bangweolo, from which it issues under the name Luapula, and flows north to Lake Mweru; from the north side of this lake issues the Lualaba, which passes through a magnificent series of lake-like expansions and receives numerous tributaries. Below Stanley Falls it receives the Lomami, and above Stanley Pool the Kwa, which is formed by the junction of the Kasai-Sankuru system with the Lukuallu or Kwango. Other tributaries come from the south, and in the north it is fed by the Ubangi, which, under the name of the Wellé-Makua, comes from the water-parting between the Nile and Congo systems. The total length of the Congo is about 3000 miles, and its drainage area 1,450,000 square miles. Unlike most of the African rivers, the mouth of the Congo forms an estuary. It is estimated to pour into the ocean a larger body of water than the Mississippi. The Kwanza rises in the Mossamba Mountains, and curves north-west to the ocean. Like most African rivers, its upper course is interrupted by cataracts, and its mouth closed by a bar. The Kunene rises on the opposite side of the same watershed, and flows south-west to the Atlantic. From it southwards to the Orange River follows a dry belt, through which no considerable

river flows to the sea. The Orange, though it rises near the eastern coast, and flows nearly across the southern part of the continent, passes for the greater part of its course through a desert region, receiving no tributaries, and is a shallow stream. Its headwaters, the Vaal and the Nu Gariep, rise on opposite slopes of the Drakenberg Mountains, and flow to their junction round opposite sides of the Orange Free State. The Great Fish River, which drains Great Namaqualand, enters the Orange River near the termination of its course.

The rivers which reach the ocean do not account for the whole drainage of Africa. There are two great and numerous smaller tracts from which no large river reaches the sea. The two great areas of internal drainage correspond with the two great deserts. That of the northern desert is estimated at 4,000,000 square miles. As already indicated, it is furrowed with water-courses in every direction, which lose themselves in the sand. The Bahr-el-Ghazal, which is usually dry, but intermittently flows out of Lake Chad, terminates in the salt lagoon of Bodele in the desert to the north of the lake. In the south the Zuga or Botletle, which forms the outlet of Lake Ngami, in the Kalahari Desert, loses itself in salt lagoons at greater or less distance, according to the supply of water. A region of inland drainage, with salt lagoons, also exists between the Victoria Nyanza and the coast range of mountains. In the low coast land east of Abyssinia the river Hawash loses itself in the sands before reaching the sea; and the Webbe, as already stated, which flows south from the Somali Peninsula to near the equator, likewise terminates in a salt lagoon on the border of the ocean. The Omo flows into the north end of Lake Rudolf.

Lakes.—The only lake of considerable extent north of 5° N. lat. is Lake Chad, an enormous flooded swamp. Lake Tana in Central Abyssinia, the salt Lake Asal in the east, and Lakes Dembel and Abayo in Gallaland, are comparatively small. Between 5° N. and 15° S. is a series of lakes forming one of the most striking features of the continent. Almost in a line, beginning in the south, are Lakes Nyasa, Tanganyika, Kivu, Albert Edward, Albert, all lying in more or less elongated rifts or gorges. The series is continued by Lakes Rudolf (salt) and Stefanie in the N.E., and according to some authorities, by the ancient lake now the Red Sea, and by the Dead Sea in Palestine. The great Lake Victoria, which touches the equator on the north, is of a different type, as is Lake Bangweolo (another flooded swamp) on the south of Tanganyika, and Lake Mweru to the north of Bangweolo. Lake Rikwa or Leopold, between Nyasa and Tanganyika, is partly of the rift type, while Lake Ngami in the Kalahari region is a swamp which sometimes dries up. Lake Leopold II. and Lake Malumba are attached to the Lower Congo. Lake Dilolo is in the swampy region forming part of the water-shed between the Congo and Zambezi. There are numerous salt lagoons in the northern portion of the Sahara.

Climate.—The climate of Africa is mainly influenced by the fact that, except the countries on the north and south coast, it lies almost entirely within the tropics. The equator, as already observed, cuts it nearly through the middle, so that it belongs in latitudinal, though unequally in longitudinal extension, to the northern and southern tropics. It is the only continent which extends unbroken from the northern to the southern tropics, and is consequently the hottest of all. The two sections north and south of the equator have, as has already been observed, in some respects a very considerable resemblance in their general features, the chief modifying circumstances being the greater elevation and the smaller longitudinal extension of the southern division, which, by bringing it more within the influences of the ocean, tends to modify its climate.

In the belt immediately under the equator, both north and south, vegetation is intense, and rain abundant. For about 10° north and south we find true tropical forests, mainly to the west of the great lakes, on the Middle and Upper Congo and its affluents, and along a belt of the west coast in the Niger region. To the east of the great lakes, where the rainfall is not so abundant, are considerable areas of poor steppe and scrub country, and generally over the tropical region the trees are scattered and the country more park-like than forestal. Animal life, from herds of elephants to innumerable swarms of insects, abounds in these luxuriant regions. To the north and south of the equatorial belt, as the rainfall diminishes, the forest region is succeeded by open pastoral and agricultural country. This pastoral belt extends, in the north, across the Sudan, from Senegambia to Abyssinia; on the south, from Angola and Benguela to the Zambezi. This is followed by the rainless regions of the Sahara on the north and the Kalahari Desert on the south, extending beyond the tropics, and bordering on the agricultural and pastoral countries of the north and south coasts, which lie entirely in the temperate zone.

The winds and rains in Africa are chiefly produced by the successive exposure of the various intertropical belts to the vertical rays of the sun. The monsoons of the Indian Ocean exercise the principal modifying influence. From March to September the south-west monsoon blows from Africa to Asia, and during the remaining months the north-east monsoon blows towards the African coast. The indraught of air charged with moisture, at the seasons when the sun is overhead, produces the rainy seasons within the tropics, and as the incessant rarefaction of the air by heat continually draws in fresh supplies, the rainfall is on the whole abundant, varying from 50 to 100 inches in the region between 10° N. and the Tropic of Capricorn. In a patch on the Gulf of Guinea the 100 inches is exceeded, though in Somaliland there are almost rainless patches. Near the tropics, to which the sun comes only once a year, there is only a single rainy season, while in the central part of the zone, which the sun traverses twice in his passage between the tropics, there are two distinct rainy seasons, a greater and a less, according as the wind is in a direction which brings more or less moisture, except in some places in the interior, where the two rainy seasons are so protracted as to blend into one, lasting, as in the Manyuema country, from September to July, or in some other parts even longer. The rainy season usually begins soon after the sun has reached his zenith, but on the east coast the monsoon, charged with the moisture of the Indian Ocean brings it earlier. In the deserts, as already observed, there is hardly any rain, and this applies also to Egypt, which, but for the Nile, would be no better than the Sahara. The chief cause of the rainlessness of the deserts is the direction of the winds, which causes the chief moisture-bearing currents to pass before reaching them over hot and thirsty regions which deprive them of their moisture, and especially the mountain screens which intercept the moisture of the winds both from north-east and south-west. Another cause is the want of elevated regions to attract the moisture actually contained in the atmosphere, as in the higher regions of the desert periodical rains do occur. The high mountains of the eastern plateau and the intervening tropical regions deprive the north-east monsoon of all its moisture before it reaches the Kalahari Desert. Hence the apparently anomalous circumstance that the greatest heat is

found after the equatorial region is passed. The rapid radiation of heat in the desert causes a very great fall of temperature after the sun is down, so that sometimes frosts are generated, and this in some measure supplies the want of rain by condensing the moisture in dew. In the desert, too, scorching winds are generated, those of the north afflicting Egypt and the countries on the Mediterranean coast. The hottest part of the Sahara is in Nubia, where the Arabs say the soil is like a fire, and the wind like a flame. The coasts of tropical Africa, especially the west coast, where European settlements have been formed, have been found to have a deadly climate for Europeans. But better knowledge of climatic conditions and of tropical diseases and how to treat them, and greater attention to hygienic rules, have tended considerably to counteract unhealthy influences, while the improvement of communications with the plateau and high lands of the interior renders it possible to escape from the unhealthy conditions of the coast. The problem of the possibility of the permanent settlement of the white races in tropical Africa still remains to be solved.

Geology, Minerals.—The geology of Africa is still very little known. Very ancient crystalline rocks are found rising into mountain ranges and sometimes spread over large areas. Most of the rocks that overlie them belong to the older formations, so that the continent as a whole is supposed to be of very ancient date. The sands which cover so large an area are believed to be mainly of æolian origin, and not to have been formed by the action of water. The porous clay found so abundantly in West Africa is of comparatively recent date. The region around Tanganyika is of Jurassic origin. Around the great lakes are abundant evidences of enormous volcanic activity at no very remote date; and, as already mentioned, active volcanoes are not unknown. Tanganyika, according to recent views, may at one period have been connected with the sea. Salt is abundant, though often scarce from want of communication and working organization. Gold is found in abundance in Southern Africa from the Transvaal region to the Zambezi, and a number of very productive mines have been opened in the Transvaal. Diamonds have been found in large numbers, and in apparently inexhaustible supply, on the Vaal River and its tributaries. In the southern central district, particularly the country of Katanga, iron and copper are found, and are worked in some districts in the countries bordering on the Lualaba. Copper is also found in Loanda, iron in Angola, and lead, tin, iron, and copper in Great Namaqualand; iron, copper, and coal are found in Natal. In general the border mountains are rich in metals, and when the interior ones are better known they will probably also be found to be so.

Vegetation.—The centre of Africa possesses, as already mentioned, an exuberant tropical vegetation. The open pastoral belt at the extremities of the tropics is distinguished by a rich and varied flora. A special characteristic of the vegetation of the southern extremity of Africa is the remarkable variety, size, and beauty of the heaths, some of which grow to 12 or 15 feet, and form miniature forests. Cycadaceæ and bulbous and orchidaceous plants, aloes and other succulent plants, also abound. The baobab or monkey-bread tree, first discovered by Adanson in Senegal, is found from the Sudan to Lake Ngami, and palms of one variety or another are diffused over almost every part of Africa. The date-palm is the special characteristic of the desert, to which it is peculiarly adapted, and there it forms the principal means of subsistence. It is also cultivated as a garden plant in the northern coast regions. This district as well as Egypt has an ancient celebrity for its fertility in grain. Wheat and maize are cultivated, fruit-trees also abound, and groves of oranges and olives distinguish the landscape. The castor-oil plant, the fig-tree, the dwarf-palm, and the lotus, formerly an important article of food, are here characteristic forms. The common oak, the cork-oak, and the pine form the staple, and the cypress, myrtle, arbutus, and fragrant tree-heaths the ornaments of the woods. The pastoral tropical belt presents a different order of vegetation. Besides the baobab, the cabbage-palm, the oil-palm, the wax-palm, the shea-butter tree, the cotton-tree, the African oak, and the mangrove here prevail; rice and maize are cultivated; the principal fruits are the banana, papaw, custard-apple, lemon, orange, and tamarind. India-rubber plants are found in various forms, both as trees and as climbing plants in abundance both in east and west tropical Africa. The prevalent plants of this district are also found in the fertile parts of Nubia. To the north-east of this region frankincense, myrrh, cinnamon, and cassia abound. The coffee plant is a native of the southern Abyssinian region, and also of western tropical Africa, where it forms thick woods. This plant is supposed to have been transported from Africa to Arabia. Abyssinia, though coffee and spices are native products, possesses generally, from its elevation, the vegetation of a temperate region. The swamps of the tropical region abound with papyrus. The cassava, yam, pigeon-pea, and ground-nut are cultivated as bread plants. A fuller account of the specific vegetation of different regions will be found on referring to the separate articles.

Animals.—The fauna of Africa is extensive and varied, and numerous species of mammals are peculiar to the continent. According to a common view of the geographical distribution of animals, the north of Africa belongs to the Mediterranean subregion, while the rest of the continent forms the Ethiopian region. Africa possesses numerous species of the order quadrumana (apes and monkeys), most of which are peculiar to it. They abound especially in the tropics. The most remarkable are the chimpanzee and the gorilla. The lion is the typical carnivore of Africa. Latterly he has been driven from the coast settlements to the interior, where he still reigns king of the forest. There are three varieties, the Barbary, Senegal, and Cape lions. The leopard and panther rank next to the lion among carnivora. Hyænas of more than one species, and jackals, are found all over Africa. Elephants in large herds abound in the forests of the tropical regions, and their tusks form a principal article of commerce. These are larger and heavier than those of Asiatic elephants. The elephant is not a domestic animal in Africa as it is in Asia. The rhinoceros is found, like the elephant, in Middle and Southern Africa. Hippopotami abound in many of the large rivers and the lakes. The zebra and quagga used to abound in Central and Southern Africa, but the latter is said to be now entirely extinct. Of antelopes, the most numerous and characteristic of the ruminating animals of Africa, at least fifty species are considered peculiar to this continent, of which twenty-three used to occur in Cape Colony. The giraffe is found in the interior, and is exclusively an African animal. Several species of wild buffaloes have been found in the interior, and the buffalo has been naturalized in the north. The camel, common in the north as a beast of burden, has no doubt been introduced from Asia. The horse and the ass (onager) are natives of Barbary. The cattle of Abyssinia and Bornu have horns of immense size, but extremely light. In Barbary and the Cape of Good Hope the sheep are broad-tailed; in Egypt and Nubia they

are long-legged and short-tailed. Goats are in some parts more numerous than sheep. The ibex breed extends to Abyssinia. Dogs are numerous, but cats rare, in Egypt and Barbary. The former in the northern towns serve as scavengers. Bears, wolves, and foxes are found only in the north. The birds of Northern Africa are almost identical with those of the south of Europe and the Asiatic countries bordering on the Mediterranean. Many of the African birds are famed for the brilliancy of their plumage, such as the sun-birds, bee-eater, roller, plaintain-eater, parrots, and kingfishers. The ostrich is found nearly all over Africa, but especially in the desert. A remarkable bird of Southern Africa is the secretary-bird or serpent-eater, which renders great service to the inhabitants by killing serpents. Another peculiar bird of South Africa is the honey-guide cuckoo, which points out the nests of bees. The whale-headed stork, remarkable for its enormous beak, may also be mentioned. Owls, falcons, eagles, and vultures are numerous. Waterfowl are abundant on the lakes and rivers, and there are many species of quails and partridges. One species of gallinaceous bird, the Guinea-fowl, has been domesticated in other countries. Reptiles, owing to the dryness of the climate, are comparatively few. The largest is the crocodile, which abounds in the great rivers and tropical lakes. There are several species of venomous serpents, including the horned viper and the African cobra. The chameleon is common. The rivers and coasts abound with fish of numerous species, and some of them of the most brilliant colouring. Insects are numerous. Among the more troublesome species are the locust, tsetse, and white-ant.

Inhabitants, Civilization, &c.—Of the African races a fuller description than can here be given will be found under ETHNOLOGY, and also under the various subdivisions of the Continent. There is a marked distinction between the races in the north and east of the great desert and those in the Central Sudan and the rest of Africa and the south. The main elements of the population of North Africa, including Egypt and Abyssinia, are Hamitic and Semitic, but in the north the Hamite Berbers are mingled with peoples of the same race as those of prehistoric Southern Europe, and other types of various origins, and in the east and south-east with peoples of the negro type. The Semitic Arabs are found all over the northern region, and even in the Western Sahara and Central Sudan, and far down the east coast as traders. The Somalis and Gallas are mainly Hamitic. In the Central Sudan and the whole of the country between the desert and the Gulf of Guinea the population is pure negro—people of the black, flat- or broad-nosed, thick-lipped type, with narrow heads, woolly hair, high cheek-bones, and prognathous jaws. Scattered among them are peoples of a probably Hamitic stock. Nearly the whole of the narrow southern section of Africa is inhabited by what are known as the Bantu races, of which the Zulu or Kaffir may be taken as the type. The languages of the Bantu peoples are all of the same structure, even though the physical type vary, some resembling the true negro, and others having prominent noses and comparatively thin lips. The Bushmen of South Africa are of a different type from the Bantu, probably the remains of an aboriginal population, while the Hottentots are apparently a mixture of Bushmen and Kaffirs. Scattered over Central Africa, mainly in the forest regions, are pigmy tribes, who are generally supposed to be the remains of an aboriginal population. The bulk of the inhabitants of Madagascar are of Malay affinities. The total population is estimated at about 150,000,000.

As regards religion, a great proportion of the inhabitants are heathens of the lowest type. Mohammedanism possesses a large number of adherents in northern Africa and is rapidly spreading in the Sudan. Christianity prevails chiefly among the Copts of Egypt, the Abyssinians, and the natives of Madagascar, the latter having been converted in recent times. Elsewhere the labours of the missionaries have also been attended with promising success. Over a great part of the continent, however, civilization is at a low ebb, and in the Congo region cannibalism is extensively prevalent. Yet in various regions the natives who have not come in contact with a higher civilization show considerable skill in agriculture and various mechanical arts, as in weaving and metal working. Among articles exported from Africa are gold and diamonds, palm-oil, ivory, wool, ostrich feathers, esparto, cotton, caoutchouc, &c. The total annual trade has been estimated at £100,000,000.

Political Divisions. — By recent arrangements, mainly since 1884, great areas in Africa have been allotted to Great Britain, France, Germany, Portugal, Belgium, and Italy, as coming within their respective spheres of influence (see the map), in addition to colonial possessions proper. The areas claimed by the various European powers in Africa may be roughly estimated as follows:—France, 3,800,000 square miles; Great Britain, 2,200,000 square miles; Germany, 930,000 square miles; Portugal, 790,000 square miles; Belgium (Congo Colony), 900,000 square miles; Italy, 180,000 square miles; Spain, 80,000 square miles. The chief British colonial possessions are the Cape Colony, Natal, Orange Free State, and Transvaal, now forming the Union of South Africa, Rhodesia, Nyasaland, British East Africa, Uganda, Somaliland, Northern and Southern Nigeria, Gold Coast, Gambia, Sierra Leone, and Mauritius. Although Egypt, like Tripoli, is nominally under Turkey, it is actually under British suzerainty. The Congo Free State has become a Belgian colony. Liberia, Abyssinia, and Marocco are separate independent states. Separate articles will be found on the following divisions:—Abyssinia, Algeria, Angola, Ashantee, Barca, Bechuanaland, Bornu, Cape Colony, Congo Free State, Dahomey, Darfur, Egypt, Fezzan, Liberia, Madagascar, Marocco, Mashonaland, Matabeleland, Mozambique, Natal, Nigeria, Nubia, Orange River State, Rhodesia, Sahara, Senegambia, Sudan, Transvaal, Tripoli, Tunis, Uganda, Zanzibar, &c.

History of Discovery.—Africa, until within very recent times, was 'the Dark Continent', the least known of the great divisions of the globe, and the problems to be solved were among the most interesting to the geographer of those remaining for exploration. Sixty years ago the whole of Central Africa was a blank; it is now at least as well known as South America. The civilized nations of the ancient world approached Africa from the Mediterranean and the Red Sea; there is reason to believe that until the introduction of the camel in the seventh century A.D. the desert was an insuperable barrier between the Mediterranean countries and the Central Sudan.

The name Africa is mythologically associated with Afer, a son of the Libyan Hercules. It was the name given by the Romans at first only to a small district of Africa in the immediate neighbourhood of Carthage, and nearly corresponding with the Roman province formed on the destruction of Carthage. The Greeks called Africa Libya, and the Romans often used the same name. The first African exploring expedition on record is that mentioned by Herodotus as having been sent by Pharaoh Necho about the end of the seventh century B.C. to circumnavigate the continent. The navigators, who were Phœnicians,

Figs. 1, 2, Mpongwe of the Gaboon. 3, Arab of Marocco. 4, Arab of Southern Tunis.
13, Congo Negro. 14, Zulu. 15, Boy of Bagirmi. 16, Monbuttu. 17, Niam-Ni
25, 26, Bushmen. 27, Sakalava of Madagascar. 28, Suaheli of Zanzibar 29, 30,

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6, 7, Copts. 8, Koto of the Niger. 9, Fan. 10, Berber. 11, Negro of Dar-Fur. 12, Nubian.
8, Shuli Negro (Upper Nile). 19, 20, Abyssinians. 21, 22, Hottentots. 23, Bechuana Girl. 24, Akka.

e Bibliographisches Institut, Leipzig.

were absent three years, and according to report they accomplished their object. The story has been the subject of much controversy, and was for long generally discredited, but recent authorities of weight have pronounced in its favour. The next important voyage recorded is that of Hanno, a Carthaginian, down the west coast, probably fifty or a hundred years later. He passed a river with crocodiles and river-horses, and probably reached the coast of Upper Guinea. Herodotus also mentions some young men of the tribe of the Nasamones (living near the Gulf of Sidra) crossing the desert in a westerly direction, and coming to a great river where they saw crocodiles and black men, but it is doubtful if this could have been the Niger. There is no evidence that the Egyptians knew the Nile beyond the site of Khartum, though they may have sent ships as far as the coast of Somaliland by the Red Sea. Nero sent an expedition up the Nile which seems to have penetrated up the White Nile; and remains of Roman origin have been found some distance into the Sahara. From the navigators and traders that frequented the east coast of Africa, Ptolemy may have learned that the Nile issued from two great lakes about the equator. Mohammedanism was carried into North Africa in the seventh century, and very rapidly spread to the Atlantic. By the tenth century the Arabs had crossed the desert, and between this and the fourteenth century Arab travellers visited the Central Sudan, the Niger, and other regions, and until comparatively recently they were the great authorities on much of Central Africa. The first impulse to a more complete exploration of Africa was given by the Portuguese prince known as Henry the Navigator, who, in the early part of the fifteenth century, sent out a series of expeditions along the west coast. These were continued after his death, so that in 1486 Bartholomew Diaz doubled the Cape, and in 1497 Vasco da Gama sailed up the east coast as far as Mombasa, and thence to India. Thus for the first time the main outline of the African coast was laid down. New settlements were planted on the east and west coasts by Portuguese, French, English, Dutch, and Brandenburgers, but there is no authentic information that any European penetrated into the interior. Maps of the sixteenth to the eighteenth century were covered with lakes and rivers, but these were swept away as unauthentic by D'Anville in the middle of the eighteenth century, and the interior left a blank. An association for the exploration of Inner Africa was formed in London in 1788. Additions were made to geography under its auspices by Mungo Park, Hornemann, Burckhardt, and others. The society merged in the Royal Geographical Society in 1830.

Modern African exploration may be said to begin with Mungo Park, who reached the upper course of the Niger or Joliba, and whose efforts to explore the river to its mouth cost him his life (1795–1805). (See PARK, MUNGO.) Dr. Lacerda, a Portuguese, about the same time reached the capital of Cazembe, west of Lake Bangweolo, where he died. Hornemann, who travelled for the same society as Park, perished in the desert after sending home accounts of Bornu and the neighbouring states. In 1802–6 two Portuguese traders crossed the continent from Angola, through Cazembe's dominions, to the Portuguese possessions on the Zambezi.

In 1816 Captain Tuckey, in command of a British expedition, sailed up the Congo, which he took to be the mouth of the Niger, for 280 miles. About the same time Major Peddie, and after his death Captain Campbell, led a party up the Senegal through the Fula or Fellatah territory, returning to Kakundy on the Nunez. In 1817 Mr. Bowditch explored the country of the Ashantis. In 1818 a French traveller, Gaspard Théodore Mollien, discovered the sources of the Senegal, Gambia, and Rio Grande. In 1819 Ritchie and Lyon travelled from Tripoli to Murzuk, and in 1821 Major Laing made some important journeys in the Mandingo district of Western Africa. In 1822–24 extensive explorations were made in Northern and Western Africa by Major Denham, Captain Clapperton, and Dr. Oudney, the last of whom died on the way. (See the articles on DENHAM and CLAPPERTON.) The travellers proceeded from Tripoli by Murzuk to Lake Chad. While Denham examined the south and west coasts of the lake, Clapperton proceeded west through Bornu to Sokoto, the capital of the Fellatah country, on the Sokoto, an affluent of the Niger. Impressed with the importance of establishing political and commercial intercourse with this district, Clapperton organized another expedition for the purpose of reaching Sokoto from the west coast. Setting out from Badagry, on the east of Cape Coast Castle, on 7th December, 1825, and passing through the Kingdom of Yoruba, he reached the Niger at Bussa. Here he crossed the river and traversed the Kingdom of Nupe to Kano, capital of the Haussa country, which he had previously visited, and from thence proceeded to Sokoto, in the neighbourhood of which, after a short residence, he died. His servant, Richard Lander (see LANDER), returned to Kano, and attempted to proceed south through the Kingdom of Zegzeg, but was compelled by the natives to return to Darroro, from which he reached the coast.

W. Allen, a naval officer, about this time accompanied a mercantile expedition up the Niger, which he surveyed for a certain distance, and in another expedition in 1848 the same officer revised and corrected his survey. Major Laing, in 1826, crossed the desert from Tripoli to Timbuctoo, but he was killed on his return, and his papers lost. René Caillié, after living for some years on the Senegal coast learning the language, and initiating himself into the religion and manners of the Arabs, made in 1827–28 a journey to Timbuctoo, and thence through the great desert to Marocco. Richard Lander, accompanied by his brother, leaving Badagry for Bussa in March, 1830, ascended the river Niger to Yauri, and descending from thence, reached the mouth called the Nun in November. In 1832 he traced other mouths of the river up to the main stream; and the identity of the great river, which passes under various names in different parts of its course, was thus established.

In the south Livingstone (see LIVINGSTONE), who was stationed as a missionary at Kolobeng in 1849, passed through the desert of Kalahari, reached the Zuga or Botletle, and after a circuitous route discovered its source in Lake Ngami. In 1851 he went north again, proceeding from the Zuga in a more easterly direction. In 17° 25′ S. lat., and between 24° 30′ and 26° 50′ E. lon., he came upon numerous rivers flowing north, which were reported to be affluents of a larger river, the Zambezi.

In 1848 and 1849 Krapf and Rebmann, missionaries stationed near Mombasa, saw the mountains Kilimanjaro and Kenia. In 1851 Francis Galton, starting from Walfisch Bay, made an extensive survey of the Damara and Ovampo countries, in which he found high pastoral and agricultural table-lands. An expedition under the patronage of the British government started from Tripoli in 1850 to visit the Sahara and the regions around Lake Chad. Richardson, the originator of the expedition, was joined by two Germans, Drs. Overweg and Barth. (See BARTH, HEINRICH.) In crossing the desert from Murzuk to Ghat they found some interesting sculptures. From Ghat to Air they found the country wholly desert

and uninhabited. On reaching Lake Chad Richardson went to Kuka, capital of Bornu, Barth to Kano, Overweg to the native states of Mariadi and Guber. Barth and Overweg met again at Kuka in April, 1851, but in the meantime Richardson had died. Overweg explored the lake and Barth proceeded on another journey south to Massena, in the Kingdom of Bagirmi. On his return the death of Overweg left him to prosecute the enterprise alone. He proceeded to Timbuctoo *via* Kano, and after collecting much information about the Niger and its tributaries over a great part of the course of which he travelled on his return to Kuka, he reached Tripoli in August, 1855. Dr. Vogel, who was sent to join Barth, was put to death at Wadai, and his papers were lost.

Dr. Livingstone began another journey from Kolobeng on 15th January, 1853. After staying a month at Linyanti, capital of the Makololo, he proceeded down the Chobe to Sesheke, and thence ascended the Leambye (Zambezi) to the junction of the Liba. After returning to Linyanti, and taking with him a party of Makololo, he again set out (11th November, 1853), reached the Liba (27th December), and proceeded to Lake Dilolo, where he found the watershed of the streams which flow north and south (feeders of the Congo or the Zambezi) at a level of 4000 feet above the sea. On his return journey he was confirmed in the belief that an elevated plateau here crosses the country, and forms the watershed of the whole continent. He next crossed the river Cassabi, and on 4th April he reached the banks of the Kwango, both these rivers being affluents of the Congo. Crossing the Kwanza, he reached Loanda on 31st May. On 20th September he set out on his return journey, and following pretty nearly the route by which he had gone arrived at Linyanti. Starting from this place on 3rd November, 1855, he reached the Zambezi, and proceeding down the river, and visiting its falls, called by him the Victoria Falls, arrived at Kilimane at its mouth on 20th May, 1856, and sailed for England. Thus was accomplished by Dr. Livingstone the remarkable feat of crossing the entire continent from sea to sea—the first time, so far as is known, that this was done by any European. In 1858 Livingstone returned to resume his exploration of the Zambezi regions. Entering the Congone mouth of the river in May, he ascended its tributary the Shire to Murchison Cataracts, visited Lake Shirwa and Lake Nyasa, travelled on or near the Zambezi to Victoria Falls, established the identity of the Leambye and the Zambezi, sailed up the Shire to Lake Nyasa, also sailed 156 miles up the river Rovuma, and returned to England in 1864.

Between 1856 and 1865 Paul du Chaillu travelled extensively on the western coast, in the neighbourhood of the river Ogowe (or Ogobai). In 1861–62 Major (afterwards Sir) R. F. Burton also travelled on the west coast. He ascended the Cameroons Mountains, and confirmed some of the observations of Du Chaillu. A French expedition visited the delta of the Ogowe in 1864. Since then that river has been very fully explored, the principal expeditions having been those of Walker, 1866, 1873; Lieutenant Aymes, 1867–1868; the Frenchmen Compiègne and Marche, 1872–1874; Dr. O. Lenz, 1876; and another French expedition under Savorgnan de Brazza, 1876, who took possession of a large stretch of territory for France. This territory now forms part of that of French Congo, which has been traversed by various Frenchmen, including Brazza, Mizon, Le Maistre, Monteil, and others.

In 1866 Livingstone entered on his last great series of explorations, the main object of which was to settle the position of the watersheds in the interior of the continent south of the equator, and to discover the source of the Nile. Landing at the mouth of the Rovuma he proceeded south-west round the southern end of Lake Nyasa, and then travelling northwards, reached the southern end of Lake Tanganyika (discovered by Speke and Burton in 1858). He afterwards visited Lakes Mweru and Bangweolo, in the basin of the Chambeze, the name given to a headwater of the Congo. In 1869 he reached Ujiji, on Tanganyika, and crossed the lake, making extensive journeys in the Manyuema country, and reached the Lualaba or Upper Congo, but could not explore it for want of boats. Mr. H. M. Stanley, who had been specially sent by the proprietor of the New York Herald to search for Livingstone, met him at Ujiji on his return from the Manyuema country, relieved his necessities, and examined along with him the northern end of Lake Tanganyika. Livingstone afterwards started on a fresh journey (in 1872) to determine the course of the Lualaba, intending to travel round the south side of Lake Bangweolo, but, after suffering much from illness, he died on the shore of this lake on the 1st May, 1873.

Numerous travellers subsequently to Livingstone have explored the country between the Cape settlements and the Zambezi, as well as regions north of the river; and a great part of this portion of Africa is now ranked as British territory. The discovery of gold (1866–1867) in the mountains between the Zambezi and the Limpopo by Karl Mauch, an extensive traveller in this district, gave a great stimulus to exploration. Names to be specially mentioned in this connection include those of Erskine, Baines, Holub, and Selous. Under the British South Africa Company this region is being rapidly opened up and settled; while settlement and civilization (including the railway) are rapidly spreading under British influence north of the Zambezi.

Gerhard Rohlfs, one of the most enterprising of German travellers, in a succession of journeys from 1861 to 1874 traversed the Sahara in various directions, visiting the oases of Twat, Tafilelt, &c., in the west, crossing the continent entirely from Tripoli to Lagos by way of Murzuk, Bornu, &c., and finally exploring the oases on the route between the Central Sahara and Upper Egypt. Between 1868 and 1871 Dr. Schweinfurth traversed the Libyan Desert, reached the extreme southern limit of the Nile valley, visited the Niam-Niam and Monbutto countries, and determined the western limit of the Nile basin by the course of the Uelle. Dr. Nachtigal (1869–1874) visited Tibesti and Borgu in the Eastern Sahara, and travelled from Wadai and Darfur to Upper Egypt.

In 1872 the Royal Geographical Society organized two expeditions to go in search of Livingstone. The one, under Lieutenant Grandy, sailed some distance up the Congo; the other, under Lieutenant Cameron, started from Zanzibar for Tanganyika. On ascertaining the death of Livingtone he proceeded to Lake Tanganyika, where he secured Livingstone's map, and sent it to Zanzibar. He ascertained the height of the lake; found an outlet, the Lukuga, on the western side; traversed the Manyuema country; reached Nyangwe, Livingstone's farthest point on the Lualaba; proceeded south up the eastern side of the valley of Lomane to Kilemba in the Urua country; and reached Benguela, on the Atlantic coast, 4th November, 1875. The identity of the Congo and Lualaba was at last settled by Stanley, who between October, 1876, and August, 1877, descended from Nyangwe on the latter river to the mouth of the former. After helping to establish the Congo Free State (1879–1885) Stanley proceeded in 1887 with an expedition to relieve Emin Pasha,

governor of Egypt's equatorial province. Following the Congo and its tributary the Aruwimi, Stanley hewed his way through a vast forest, arrived at the Albert Nyanza, met Emin there, returned for his rear-guard and stores, and at last brought Emin and his followers to Bagamoyo, on the east coast, in 1889. He also discovered Lake Albert Edward and the lofty mountain of Ruwenzori, on the Semliki, between that lake and Lake Albert. The Portuguese Major Serpa Pinto journeyed from Benguela to Natal in 1878–79; the Germans Wissmann and Pogge crossed from St. Paul de Loanda to Zanzibar in 1881–82; in 1879–80 (after the death of his leader, Keith Johnston), Joseph Thomson crossed from the east coast by the north of Lake Nyasa to the east of Tanganyika, and back to Zanzibar; again in 1883–84 he explored the Masai country between the coast and Lake Victoria; Capello and Ivens went from Angola to Mozambique by way of Bangweolo in 1884–85.

One of the most interesting problems connected with African geography was the tracing of the source of the Nile. Among the first of the famous explorers in this direction was James Bruce, who in 1770 reached the source of the Blue Nile or Bahr-el-Azrek, and imagined himself to have solved the great problem. But the real source of the Nile remained long unknown, the great lakes connected with its origin being hardly dreamed of till comparatively recent times. In 1858 Burton and Speke, crossing from Zanzibar, discovered Lake Tanganyika, and the same year Speke also reached the Victoria Nyanza, but did not ascertain that it gave rise to the Nile. Speke and Grant in 1862 reached the place where the Nile leaves the lake and followed part of its course to Karuma Falls. At Gondokoro they met Sir Samuel Baker, who proceeded to investigate the unexplored part, but did not fully succeed in his object. Baker in 1871–73 returned to the scene of his explorations as the commander of an Egyptian force, and took possession of the country in the name of the khedive, but added little to his previous geographical discoveries. He was succeeded in his command by Colonel Gordon, one of whose officers, Colonel Long, more fully traced the Nile between the Karuma Falls and the Victoria Lake; while another, M. Gessi, first actually traced the Nile up to its outflow from the Albert Nyanza (1876). Emin Pasha (Dr. Schnitzer), already mentioned, was also one of Gordon's officers. Having been appointed governor of the equatorial province of Egypt in 1878 he maintained his position at Wadelai in the Nyanza region till relieved by Stanley, being subsequently murdered in the interior. Since then the details of the lakes and rivers that contribute to the Nile have been very fully filled in.

Since the 'scramble for Africa' began in 1883, the exploration of Africa has been carried out by a multitude of explorers. In the north the French have pushed south from Algeria, and French explorers, among whom M. Foureau is prominent, have added greatly to our knowledge of the Sahara. Dr. Junker devoted several years to exploring the country between the basin of the Nile and the Congo. (Sir) H. M. Stanley, in his journey across Africa, in 1876, added largely to our knowledge of Lake Victoria, and of Uganda, the country between Victoria and Lake Albert. Since the British occupation of Uganda, Sir F. J. Lugard and many other officers have mapped the country between the coast and the lakes, Uganda itself, and the country to the westward. Italian and British explorers have added to our knowledge of Abyssinia and to the desert between the Nile and the Red Sea. Lakes Rudolf and Stefanie have been discovered and explored by Count Teleki and Lieut. Von Höhnel from the south, while James, Donaldson Smith, Cavendish, Robecchi, Bottego, and others have explored Somaliland, and ascertained that the Omo flows into Lake Rudolf. Mackinder has ascended Mt. Kenia; Meyer has ascended Kilimanjaro; Baumann and other German explorers have visited the region to the west and south of that mountain, round by the south of Lake Victoria, and on to Lake Albert Edward. In 1894 Count Götzen crossed from east to west, discovered Lake Kivu to the south of Lake Albert Edward, and a lofty active volcano near its shores, coming out by the Congo. Ruwenzori was ascended by the Duke of Abruzzi in 1906. Many Germans have been busy in German East Africa, while in British East Africa, Johnston, Sharpe, Joseph Thomson and others have filled in many blanks, and British naval officers have charted Lake Nyasa. German explorers have traversed and mapped German South-west Africa; Lugard, Johnston, and others have explored the Uganda region. The officials of the Congo Free State have laid open the courses of the numerous rivers that feed the main stream; Hinde found the Lukuga flowing into the Lualaba; Grenfell and others established the connection of the Ubangi or Mobangi tributary on the north, with the Makua-Wellé higher up, which had been explored by Junker and others. Under the auspices of the Royal Niger Company Joseph Thomson and others further explored the Niger; while the Benue and its tributaries, and the German sphere in the south have been actively explored by British, French, and German travellers. All three nationalities, moreover, have been busy in the vast area between the Guinea Coast and the great bend of the Niger. Prominent among them was Binger, who contributed more than any single individual to our knowledge of this region. The French occupation of Timbuctoo has led to the navigation and exploration of the upper and middle river by gunboats; while a French expedition followed the river from Timbuctoo to its mouth. Monteil crossed from Senegal to Lake Chad and traversed the desert to Tripoli. Numerous French military expeditions have opened up the country between the West Coast and the Niger, while the officials of the British West Coast colonies have been actively exploring the interior of these colonies. Hooker and Ball, Foucauld and Joseph Thomson, have added much to our knowledge of the Maroccan Atlas. Railways are being constructed from various points round the coast, the 'Cape to Cairo' route is far advanced, so that further exploration is bound to proceed with increasing rapidity. Various expeditions have crossed from the Niger and Congo to the Nile, and all the river systems are now mapped in their main features. It may indeed be said that the pioneer exploration of Africa has been completed, though there still remains a region almost blank to the south of Abyssinia. What remains to be done is the filling up of the meshes between the vast network of explorers' routes, and this is a task which cannot be completed for many years.

AGA, a title given in Turkey to the higher military officers, dignitaries of state, land-owners, and men of wealth and influence generally.

AGADES, a town of Africa, in the Sahara, capital of the Kingdom of Aïr or Asben, 300 miles north of Kano, on the edge of a table-land 2500 feet above sea-level. Formerly a populous and important town, it has gradually declined, and the population does not now exceed 7000. The trade is chiefly in grain.

AGAMEMNON, in Greek mythology, king of Mycenæ and Argos, son (or grandson) of Atreus. He and his brother Menelaus are denominated *Atridæ* by Homer, who calls him a grandson of Pelops and great-grandson of Tantalus. From Tantalus, the founder

of the race, down to Agamemnon and his children, the members of this family of heroes (the Pelopidæ) were constantly persecuted by fate. Agamemnon and Menelaus were expelled from Mycenæ by Ægisthus, and wandered about for a time till they came to Sparta, where Agamemnon married Clytemnestra. When the Trojan war broke out, Agamemnon, as the most powerful prince in Greece, was appointed leader of the united army of Greeks, and manned alone 100 ships. The army assembled in the Bay of Aulis in Bœotia. Here they were long detained by a calm, occasioned by the anger of Artemis (see IPHIGENIA), but finally arrived before Troy. During the protracted siege of the city Agamemnon appears superior to the other chiefs in battle and in councils, and maintains, under all circumstances, the dignity of a commander. His quarrel with Achilles is described under ACHILLES. Returning home after the ten years' siege, he was treacherously assassinated. Ægisthus, whom, at his departure, he had pardoned for the murder of Atreus, and intrusted with the care of his wife and children, joined with Clytemnestra, and slew him at a banquet, together with Cassandra, the daughter of Priam (who had fallen to his share in the division of the captives), and their children. Thus says Homer; others say that Clytemnestra murdered him in the bath, having entangled him in a tunic. The cause of his murder is alleged by some to have been her adulterous connection with Ægisthus; by others, her jealousy of her husband's connection with Cassandra.

AGAMI. See TRUMPETER.

AGAMIC PLANTS. See CRYPTOGAMIA.

AGANIPPE, a fountain on Mount Helicon, in Greece, which, like Hippocrene, was said to have the property of inspiring with poetic fire whoever drank of it.

AGAPE, in ecclesiastical history (from Greek *agapē*, love), the love-feast, or feast of charity, in use among the primitive Christians, when a liberal contribution was made by the rich to feed the poor. St. Chrysostom gives the following account of this feast, which he derives from the apostolical practice. He says, 'The first Christians had all things in common, as we read in the Acts of the Apostles; but when that equality of possessions ceased, as it did even in the apostles' time, the agape or love-feast was substituted in the room of it. Upon certain days, after partaking of the Lord's supper, they met at a common feast, the rich bringing provisions, and the poor, who had nothing, being invited.' The meetings were opened and closed with prayer, and at intervals in the feast spiritual songs were sung. The bishop or presbyter who presided read out a portion of Scripture, and put questions on it to those present. Letters were then read from the overseers or leading members of other churches, and previous to the conclusion of the proceedings money was collected for the poor, widows, orphans, prisoners, the shipwrecked, &c. These love-feasts, during the three first centuries, were held in the churches without scandal, but subsequently certain evils are said to have arisen in connection with them. This gave occasion to a reformation, but ultimately the abuses became so notorious that the holding of the agapæ, in churches at least, was solemnly condemned at the Council of Carthage, in the year 397. Some modern sects, as the Sandemanians, Moravians, &c., have attempted to revive this feast.

AGAPEMONE, a conventual establishment for men and women near Bridgewater, Somersetshire, founded in 1859 by the Rev. H. J. Prince, a clergyman of the Church of England. The inmates adopted as one of their chief doctrines the principle of community of goods, and formed a small religious sect with various peculiar doctrines. Several ugly scandals have made it decidedly notorious.

AGAR-AGAR (Ceylon moss), the native name of several species of Algæ found growing on the shores of the East Indian Archipelago, and also of the glutinous jelly obtained from them by boiling. This jelly is prepared for the table, and is used likewise by the paper and silk manufacturers of Eastern Asia, in some classes of goods. It is largely imported into China and into this country, being used in finishing paper, linen, &c., as a substitute for bone-gelatine in the manufacture of confectionery, and for the culture of certain kinds of bacteria.

AGARIC (*Agaricus*), a genus of the order of Fungi (which see), and of the section Hymenomycetes. It is distinguished by the more or less fleshy substance of the *pileus* or cap, and by being furnished on the under surface, whether supported by a stem or not, with gill-like plates, bearing the naked fructification. The species are very numerous, and many of them are very beautiful, being finely coloured and elegantly formed. They are found in all parts of the world, growing best where the air is moist and where there is a moderate degree of warmth. They grow frequently on dead wood or decaying matter, also on dunghills or on highly manured land, and many of them are plentifully found in old pastures, or on the naked ground. Not a few are eatable, while others are poisonous. No positive rules can be given for distinguishing the one kind from the other, but generally speaking, when the taste of the raw fungus is not decidedly unpleasant, there is little danger. Highly coloured and strongly smelling species should, as a rule, be avoided. The common mushroom (*A. campestris*) is reckoned among the most savoury of the genus, and is much in request for the table. It is eaten fresh, either stewed or boiled, and preserved either as a pickle or in powder; and it furnishes the sauce called ketchup. It is either gathered wild or is raised artificially. The field plants are better for eating, inasmuch as they are more tender than those raised on artificial beds. The wild mushrooms are found in parks and pastures, where the turf has not been ploughed up for many years, and the best time for gathering them is August and September. Among other edible British species are the St. George's mushroom (*A. Georgii*), the horse mushroom (*A. arvensis*), and the fairy-ring mushroom (*A. Oreades*). Mushrooms may be cultivated either in open beds in the garden, or in sheds, cellars, or houses specially constructed for the purpose. The beds are made up of earth and horse-dung, and such a mixture is almost certain to produce mushrooms although no *spawn*, as it is called (the mycelium of the plant), may have been added to it, the spores and spawn being so abundantly spread naturally. Spawn, however, is usually added, being sold by nurserymen embedded in brick-like masses of earth and dung. Caves, disused tunnels, or similar places may be utilized for mushroom culture, and immense quantities are grown in the catacombs of Paris.

AGASSIZ, LOUIS JOHN RUDOLPH, the eminent naturalist, son of a Swiss Protestant clergyman, was born on the 28th of May, 1807, at Motiers, in Switzerland. He was educated at home till the age of eleven, and passed four years at the gymnasium of Bienne, from which he was sent to the Academy of Lausanne. He then studied in the Universities of Zürich (1824–26), Heidelberg, where he attended the medical school (1826–27), and Munich. At Munich he enjoyed the society and instruction of several eminent men, including Martius, Döllinger, Fuchs, and Oken. On the death of Spix the zoologist he was selected by Martius to complete the zoological

record of an Austro-Bavarian expedition to which Martius had been botanist. The result was a work containing the description and classification of the fishes which was published in 1829 (in Latin). Agassiz had not hitherto paid special attention to ichthyology, but from this time it became one of his leading pursuits. His parents having withdrawn his allowance, he applied to the publisher Cotta for assistance in his next book, which appeared in 1839 and 1840, under the title of Histoire Naturelle des Poissons d'Eaux douces de l'Europe Centrale. From 1834 to 1844 he also published five volumes, illustrated by Dinkel, of Recherches sur les Poissons Fossiles. About the time he began his preparation for these works he took simultaneously the degree of Doctor of Medicine at Munich and of Doctor of Philosophy at Erlangen. He also at this time began to project a new classification in ichthyology, based on four classes, distinguished by the characters of the scales, namely, ganoids, placoids, cycloids, and ctenoids, since Cuvier's system was not well adapted to fossil species. His system has not been generally adopted by subsequent naturalists, but the names of his classes have been freely used as adjectives. The liberality of a clergyman, a friend of his father, enabled him to visit Paris, and here he made the acquaintance of Cuvier and Humboldt, the latter of whom in 1833 supplied him with means to begin the publication of his work on fossil fishes. In 1834 Agassiz published the Prodromus of a work on Echinodermata, which was followed by other publications on the same subject. He also published in 1842–46 a Nomenclator Zoologicus, containing an enumeration of all the genera of the animal kingdom, with etymologies and names and dates of the works of the authors by whom they were first named; and he prepared a Bibliography of Zoology and Geology, which was afterwards extended by Strickland and Jardine, and published by the Ray Society. In 1836 he began the study of glaciers, and after two visits to the Alps established in 1838 a hut on the glacier of the Aar, which he visited every summer till 1845. In 1840 he published his Études sur les Glaciers, which first gave him a popular fame throughout Europe. It was followed in 1847 by his Système Glaciaire. He propounds in these the theory of a vastly extended ice area in former epochs. In 1846 he visited, together with Professor Buckland, the mountains of Scotland, where for the first time they found traces of glacier action. From 1838 Agassiz had held the appointment of professor of natural history at Neufchâtel. He was a member of nearly all the learned societies of Europe, and had received the degree of LL.D. from Edinburgh and Dublin; but his professorship was poorly remunerated, and his costly publications had entailed a heavy debt, when in 1846 he went to the United States on a lecturing and exploring tour. The professorship of zoology and geology in Harvard University, Cambridge, U.S., was offered him in 1847, and as he had previously been offered the use of the United States survey vessels for exploring purposes he accepted the offer. In 1851 he was appointed to the medical chair of comparative anatomy at Charleston, but the climate not suiting his health he returned to Cambridge in 1853. Among his more important works were: Principles of Zoology, in connection with Dr. A. Gould (1848); Lake Superior, its Physical Character (1850); Contributions to the Natural History of the United States (four vols. 1857–62); Zoologie Générale (1854); Methods of Study in Natural History (1863). In 1855 he was enabled by the liberality of Nathaniel Thayer to make, for the sake of his failing health, a long-contemplated voyage to Brazil. He was accompanied by his wife, who wrote an account of the voyage. In 1871 he visited the southern shores both of the east and of the west coast of North America. After some years of unsuccessful efforts to get a government marine station established, he was enabled by private munificence to fit up one on Penekese Island in Buzzard's Bay. Agassiz's last work was the organization of this establishment, of which he wrote an account in 1873 to the British Association, which met that year at Bradford. He died 14th December, 1873. Agassiz held views on many important points in science different from those which prevailed among the scientific men of the day. He adopted the opinion of a variety of human races, of distinct local origin. He strongly opposed the theory of development. His love of generalization was great, and nearly all his works were written with a more or less direct view to some theoretical object.—His son, Alexander Emanuel, born 1835, died 1910, was also a naturalist, and an authority on marine zoology.

AGATE, a mineral compounded of various substances, as chalcedony, carnelian, jasper, hornstone, quartz, &c. These different minerals do not all occur in every agate, commonly only two or three of them. There are different kinds of agate, as the fortification, the landscape, the riband, the moss, the tube, the clouded, the zone, the star, the fragment, the punctuated, the petrifaction, the coral, and the jasper agate, these names being given according to the manner in which the coloured constituent minerals are arranged in the specimen, and the characteristic appearance they produce. Agates seem to be formed by the infiltration of water holding minerals in solution into cavities in trap-rocks, which, from the appearance imparted to them by the geodes or agate nodules, are called amygdaloidal. In Scotland agates are commonly called Scotch pebbles. Agates are also found in various other countries; and at Oberstein in Germany, especially, they occur in great perfection and abundance. At that place they are cut into vases, snuff-boxes, cups, rings, seals, handles for knives and forks, beads, &c. The agate was highly valued by the ancients, who executed many fine works in it; and great medicinal virtues were formerly attributed to it. Agate sometimes contains figures bearing a striking resemblance to some object of nature or art, for example, a man, a ruin, an animal, &c.; sometimes it actually contains organic matter. These figures may, however, be produced by artificially staining the stone.

AGATHOCLES, one of the boldest adventurers of antiquity, was a Greek, born at Thermæ, in Sicily, in 361 B.C. On account of a mysterious oracle he was exposed in his infancy, but was secretly brought up by his mother. At the age of seven the boy was again received by his repentant father, and sent to learn the trade of a potter at Syracuse, where he continued to reside, being admitted a citizen by Timoleon. He was drawn from obscurity by Damas, a noble Syracusan, to whom his beauty recommended him, and was soon placed at the head of an army sent against Agrigentum. By a marriage with the widow of Damas he became one of the most wealthy men of Syracuse. Under the dominion of Sosistratus he was obliged to flee to Tarentum, but returned after his death, violently seized, by means of wholesale murder and banishment, upon the sovereignty and conquered the greater part of Sicily, 317 B.C. He maintained his power till 289 B.C. To strengthen his authority and to give employment to the people, he endeavoured, like Dionysius, to drive the Carthaginians from Sicily. Having been defeated by them, and besieged in Syracuse, he boldly passed over to Africa with a portion of his army, and there he fought for four years, till 307, generally with success.

Disturbances in Sicily compelled him to leave his army twice, and at his second return into Africa he found it in rebellion against his son Archagathus. He appeased the commotion by promising the troops the booty they should win; but, being defeated, he did not hesitate to give up his own sons to the vengeance of the exasperated warriors, and expose these latter, without a leader, to the enemy. His sons were murdered; the army surrendered to the Carthaginians. He himself restored quiet to Sicily, and concluded a peace (306 B.C.) which secured to both parties their former possessions. He then engaged in several hostile expeditions to Italy, where he vanquished the Bruttii and sacked Croton. His latter days were saddened by domestic strife. His intention was that his youngest son Agathocles should inherit the throne. This stimulated his grandson Archagathus to rebellion. He murdered the intended heir, and, according to the story told by Timæus and Diodorus, persuaded Mænon, a favourite of the king, to poison Agathocles. This was done by means of a quill-feather with which the king cleaned his teeth after a meal. According to some authors he died at the age of seventy-two; according to others at that of ninety-five. Agathocles possessed the talents of a general and a sovereign, but his cruelty, luxury, and insatiable ambition were the occasion of his ruin.

AGAVE, a genus of remarkable and beautiful herbaceous plants, of the natural order Amaryllidaceæ, having a tubular perianth with 6-partite limb, and triangular many-seeded capsule. They resemble aloes in their growth and general appearance, and the best-known species, the *Agave Americana*, is properly known as the American aloe. This is a large plant, the leaves of which are thick, fleshy, and spinous at the edge, and the stem branched and of great height. The flowers have the tube of the corolla narrowed in the middle, the stamens longer than the corolla, and the style longer than the stamens. This magnificent native of North America is by no means an uncommon plant in English gardens, but is seldom seen there in flower. There is indeed a notion, but an erroneous one, that the American aloe does not bloom until it is 100 years old. The fact is that the time of flowering depends almost wholly on the rapidity of its growth. In hot countries it will flower in a few years, but in colder climates, the growth being slower, it is necessarily longer in arriving at maturity. The stem, which bears the blossoms, rises from the centre of the leaves, and when the plant is in a vigorous state it frequently exceeds the height of 20 feet. Branches issue from every side, and in such a manner as to form a kind of pyramid, composed of greenish-yellow flowers, which stand erect and are seen in thick clusters at every joint. When in full flower its appearance is extremely splendid; and if the season be favourable, and the plant be sheltered from the cold in autumn, a succession of blossoms will sometimes be produced for near three months. In the warmer parts of Europe the American aloe is cultivated as an object of considerable utility. They are frequently set out in rows as fences for inclosures, particularly in Spain, Portugal, and Italy. In some parts the leaves are employed for scouring pewter, kitchen utensils, and floors, and being cut into slices are used for the feeding of cattle. The juice of these leaves is made into cakes, which are used for washing, and will make lather with salt water as well as with fresh. The fibres of the leaves yield Pita hemp or flax, which is manufactured into thread, twine, ropes, &c. This hemp is sometimes prepared by bruising the leaves and steeping them in water, and afterwards beating them. The process in some parts of Portugal is, after plucking the largest and best leaves, to place them on a square board, which a person presses obliquely between his breast and the ground, and then scrapes them with a square iron bar, held in both hands. By this operation all the juices are pressed out, and only the fibres and some of the membranous parts of the leaves remain, which are easily detached. Agave fibre is now well known in commerce, especially that called *henequen* or *Sisal hemp*, produced in Mexico, and chiefly in Yucatan. Cordage, paper, &c., is made from it. The juice of *A. Americana* and of *A. Mexicana* is fermented to form the intoxicating drink called pulque; it also yields sugar.

AGDE, a seaport in France, in the department of Hérault, on the Hérault, about 12 miles south-east of Béziers. Its houses, built of black basalt, have procured it the surname of Ville Noire; and its cathedral, built of the same material, is an ancient and remarkable structure, with a lofty square tower, which, seen at a considerable distance at sea, forms a well-known landmark. Agde is fortified, and ranks as a military place of the fourth class. Pop. (1891), 6705; (1901), 8626.

AGE, in law, the time when the law allows persons to do acts which for want of years they were prohibited from doing before. Some of the rules of the common law of England in regard to age are as follow (Kerr's Blackstone, vol. i. p. 493): 'A male at twelve years old may take the oath of allegiance; at fourteen is at years of discretion, and therefore may consent or disagree to marriage, may choose his guardian, may be an executor, although he cannot act until of age; and at twenty-one is at his own disposal, and may alien and devise his lands, goods, and chattels. A female also at seven years of age may be betrothed or given in marriage; at fourteen, is at years of legal discretion, and may choose a guardian; at seventeen may be an executrix; and at twenty-one may dispose of herself and her lands. So that full age in male or female is twenty-one years, which age is completed on the day preceding the anniversary of a person's birth, who till that time is an infant, and so styled in law.' A person under the age of twenty-one may make a purchase, but resile from it, if he chooses, on reaching his full age. No one can be chosen a member of Parliament under the age of twenty-one years. In marriages, when either of the parties is under twenty-one years, and is not a widower or widow, the consent of the parents or guardians of such minor is required, if the marriage is in pursuance of a license; or, if it be in pursuance of banns published, the parent or guardian may, at the time of the publication, declare in church his dissent to such marriage, and prevent its taking effect. With respect to crimes, fourteen years is regarded by the law as the period at which a person becomes competent to distinguish between right and wrong; between that and seven years a child may be punished if it clearly appears that he is conscious of the guilt attaching to the offence committed by him; under seven a child cannot be guilty of felony. (See CRIMINAL LAW.) The law of Scotland divides life into three periods—pupilarity, minority, and majority. The first extends up to the time of legal puberty, that is, twelve years for a female and fourteen for a male, when they may marry; the second extends from this point up to twenty-one years, which is the time when majority is attained, but it is also applied to the whole period previous to majority; the third includes the remaining portion of life. In matters of legal capacity and criminal responsibility the law of the United States is substantially the same as that of England.

AGE, a term applied to certain periods of history, as the age of Pericles, the Augustan age, the golden

age, &c. Hesiod speaks of five distinct ages:—1. The *golden* or *Saturnian age*, when Saturn ruled the earth. The people were free from the restraint of laws; they had neither ships nor weapons, wars nor soldiers; the fertile fields needed no cultivation, and perpetual spring blessed the earth. 2. The *silver age*, which he describes as licentious and wicked. 3. The *brazen age*, violent, savage, and warlike. 4. The *heroic age*, which seemed an approximation to a better state of things. 5. The *iron age*, when justice and honour had left the earth. The poet supposed this to be the age in which he himself lived. The idea of ages of the world is interwoven with the religious sentiments of various nations. We find examples of it in the thousand years of the Millenarians, and in the four Yugas or ages of the Hindus. The first, or Krita Yuga, a kind of golden age, lasted, according to their tradition, 4000 divine years, each equal to 360 solar years, and, adding its fore and after 'twilight', 1,728,000 solar years in all; men then lived 400 years, and were all giants; then the god Brahma was born. In the second period, the Tretâ Yuga, which lasted 3000 divine and 1,296,000 solar years in all, men lived only 300 years, and vice began to creep into the world. During the third age, or Dwâpara Yuga, which lasted 2000 divine and 864,000 solar years, men lived only 200 years, owing to the increase of vice. The last age, the Kâlî Yuga, that in which we now live, is to last for 1000 divine or 432,000 solar years, and the life of man is sunk to one-fourth of its original duration.

AGEN, a town in France, capital of the department of Lot-et-Garonne, on the right bank of the Garonne, 74 miles south-east of Bordeaux. Its most interesting objects are a beautiful stone bridge and a fine promenade in the vicinity, called Les Graviers. As the see of a bishop it ought to have a cathedral, but the revolutionary fury destroyed it. Its manufactures consist of sail-cloth, woollens and linens, ropes, coloured papers, &c. As a central entrepôt between Toulouse and Bordeaux it has an extensive trade. It was important under the Romans, and figured in the leading wars of French history. Pop. (1891), 21,316; (1901), 20,879.

AGENT, a person appointed by another to act for or perform any kind of business for him, the latter being called in relation to the former the principal. Various classes of agents get special names, as attorneys, factors, brokers, commission agents, &c. The limits of an agent's powers must be determined by his instructions, and these may be either special or general. If they are general he is bound to act for the best interests of his principal so far as his judgment goes and according to circumstances. If an agent, by adventuring the property of his principal in a way not justified by the usage of trade or the terms of his employment, and without the consent of his employer, bring loss upon the latter, he is bound to make good the amount of the damage. But mere carelessness is not enough to render an agent liable. He must be guilty of gross carelessness, fraud, or a breach of his positive instructions. An agent must account for all profit which he may have made by speculating or dealing with the effects of his principal. An agent is entitled to his commission or remuneration, but he may forfeit this right by misconduct. He is also entitled to be reimbursed for all justifiable advances made by him on behalf of his principal; and he has a lien over the latter's property until his just claims are satisfied. In general any agreement of any agent with a third party is binding on his principal; and even where the agent has exceeded his actual instructions, if he has not gone beyond his ostensible powers, or what the third party might reasonably presume to be his powers, the principal is bound to adhere to his agent's agreement.

AGENTS, Army, persons or firms authorized by government to manage the monetary affairs of regiments. Their duties at present are to receive monthly from the paymaster of the forces the money required for each regiment, paying the officers, squaring the regimental paymaster's accounts of the expenditure, paying the remittances of soldiers for the benefit of their families, and settling the effects and credits of the men. Army agents are appointed by the Secretary of State, and render quarterly accounts to the War Office.

AGERATUM, a genus of plants of the natural order Compositæ (belonging to the Eupatorium tribe of the order), natives of the warmer parts of America. One species, *A. Mexicanum*, is a well-known annual plant of flower borders, and has densely clustered capitula of lavender-blue flowers. Several others are also grown in gardens, some of them with purple, white, or pale blue flowers. One of these, *A. conyzoides*, has sky-blue or gray-blue flowers and flower-heads almost conical in form.

AGESILAUS, a king of Sparta, born in 442 B.C., and elevated to the throne after the death of his brother Agis II., in 398. Called by the Ionians to their assistance against Artaxerxes, he commenced his glorious career by defeating the Persians, and defending Sparta against the united attack of Thebes, Corinth, &c. In a subsequent war with Thebes he had to contend against Pelopidas and Epaminondas, the greatest generals of those times. His prudence, however, saved Sparta without the hazard of a battle. He delivered it anew at the age of eighty years, though it was actually in the hands of Epaminondas. In the spring of 361 he crossed over to Egypt with a body of Lacedæmonian mercenaries, and there, after displaying much of his former ability, he died while preparing for his voyage home, in the winter of 361–360. Though small and insignificant in person he was a noble prince, and almost adored by his soldiers.

AGGLOMERATE, in geology, a name applied to a rock consisting of angular fragments of other rocks, united or bound together by a matrix of similar materials but of finer texture. The rock is of volcanic origin, but the fragments may be either volcanic or sedimentary, having been ejected from some volcano.

AGGLUTINATE LANGUAGES, languages in which the modifying suffixes are as it were glued on to the root, both it and the suffixes retaining a kind of distinctive independence and individuality, as in the Turkish and other Turanian tongues.

AGHRIM, or Aughrim, a village in the county of Galway in Ireland, memorable for a decisive battle fought in the neighbourhood, July 12, 1691, between the forces of William III., amounting to 20,000 men, commanded by General Ginckel, and those of James II., amounting to 28,000 men, commanded by the French General St. Ruth. The forces of William were victorious, and little quarter was given to the Irish, of whom 4000 lay dead on the battle-field and nearly a like number were slaughtered in the pursuit. At a crisis of the engagement St. Ruth was killed by a cannon-ball.

AGINCOURT, or Azincourt, a village in the department of Pas-de-Calais, famous for the battle of October 25, 1415, between the French and English. Henry V., king of England, eager to conquer France, landed at Harfleur, took the place by storm, and wished to march through Picardy to Calais, in order to fix his winter-quarters in its neighbourhood. With a powerful force the dauphin advanced against him. Henry V. retreated to the Somme. The

French followed to harass his retreat, and to defend the passage from Abbeville to St. Quentin, which he gained only through the inattention of the enemy. The English, however, being destitute of everything and reduced by sickness, Henry asked for peace on disadvantageous terms. The French refused his proposals, and succeeded in throwing themselves between Calais and the English. These latter consisted of 2000 men-at-arms and 12,000 archers, and were arranged in order of battle between two hills, with the archers on the wings. Stakes, of which every man carried one, were fixed in front of them. The French, commanded by the Constable d'Albret, numbered 50,000 troops, of whom 8000 were men-at-arms; but other estimates make the French strength much greater. They arranged themselves in two divisions, with the men-at-arms, of whom 2000 were mounted, in front. The English first put themselves in motion. The French horse instantly hastened to meet them, but were received with such a shower of arrows by the archers, that they fell back on the first division, and threw it into confusion. The light-armed English archers seized their clubs and battle-axes, and broke into the ranks of the French knights, who could hardly move on account of their heavy coats of mail and the closeness of their array. The English horse rushed to assist the archers; the first French division retreated; the second could not sustain the charge of the victors; and the whole French army was soon entirely routed. The victorious army, in the pursuit of the flying enemy, took 14,000 prisoners in addition to those previously captured; 10,000 Frenchmen lay dead on the battle-field. Among them was the Constable of France, with six dukes and princes. Five princes, among whom were the Dukes of Orleans and Bourbon, were taken prisoners. The English lost 1600 men killed; among them the Duke of York, Henry's uncle, whom the Duke d'Alençon slew at his side, while pressing towards the king. D'Alençon had dashed the crown from Henry's head, and lifted his hand for a more effectual blow, when the king's attendants surrounded him and he fell covered with wounds.

AGIO, the difference between the real and the nominal value of money, a term more commonly used on the Continent than in Britain.

AGIS IV., King of Lacedæmon, succeeded his father in B.C. 244, and reigned four years. He attempted, by the introduction of new laws, to correct the abuses which had crept into the Spartan government, and to equalize property, but this he found a measure of peculiar difficulty. In consequence of his exertions against Agis's measures Leonidas, his colleague, was deposed and banished. The people, however, soon became dissatisfied with the projected reform, and while Agis was leading an army to aid the Achæans, the indiscretion of his uncle Agesilaus occasioned a conspiracy for the restoration of Leonidas. The conspirators having succeeded forced Agis to take refuge in a temple, whence he was dragged to prison. Sentence of death was passed upon him; but the ministers of the law, until forced by Democharès, refused to conduct him to a chamber reserved for the execution of criminals. He was there strangled, and he submitted to his sentence with heroic firmness. The grandmother and mother of Agis shared the same fate.

AGLAIA, according to Hesiod, one of the three Graces, daughter of Zeus and Eurynome; according to others, the mother of the Graces, and wife of Hephæstus. See GRACES.

AGNANO, formerly a small lake lying a little to the west of Naples, but drained in 1870. In its neighbourhood are the Grotto del Cane and the baths of St. Germano. The former is noted for the suffocating vapours of carbonic acid gas which ascend from its bottom. The baths are beneficial in cases of gout, syphilis, &c.

AGNATES (*agnati*), in the civil law; relations on the male side, in opposition to *cognates*, relations on the female side. Justinian abolished all distinction between agnates and cognates in respect of succession.

AGNES, ST., a saint, who, according to the received account, because she steadfastly refused to marry the son of the prefect of Rome, and adhered to her religion in spite of repeated temptations and threats, suffered martyrdom during the persecution of the Christians in the reign of the Emperor Diocletian, A.D. 303. She was first led to the stake, but as the flames did not injure her she was beheaded. Her festival is celebrated on the 21st of January. Domenichino painted a picture representing her at the moment of her execution.

AGNES, ST., the most southerly of the Scilly Islands, on the coast of Cornwall; area, 300 acres. The soil is fertile and tolerably well cultivated; but water is scarce. A lighthouse was erected here as early as 1680; another on the Wolf Rock near the island was lit for the first time in 1858.

AGNESI, MARIA GAETANA, a learned Italian lady, born at Milan in 1718. In her ninth year she spoke Latin with correctness, and also delivered an oration in this language, in which she maintained that the study of the ancient languages was proper for females. This oration was printed at Milan in 1727. In her eleventh year she is said to have spoken Greek as fluently as her mother tongue. She now proceeded to perfect herself in the oriental languages, and next studied geometry and philosophy. Mathematics latterly engaged her chief attention, and she composed a treatise on conic sections; besides which, in her thirtieth year she published a treatise on the rudiments of analysis, which has been considered as the best introduction to Euler's works, and was translated into English in 1801, by the Rev. John Colson, professor of mathematics at Cambridge. It gained her so much reputation, that she was appointed, in 1750, professor of mathematics in the University of Bologna, as successor to her father, who was compelled by ill-health to discontinue his lectures. After having held this post for about two years she secluded herself altogether from society and entered the strict order of blue nuns. She died in 1799. Her sister, Maria Theresa, is known as a composer of cantatas and operas.

AGNUS DEI (Latin, 'the Lamb of God'), a term applied to Christ in John i. 29. In the Roman Catholic liturgy it is the name for a prayer beginning with the words 'Agnus Dei' ('Lamb of God, who takest away the sins of the world, have mercy on us, &c.'), occurring in the mass, shortly before the communion. A round piece of wax, on which is impressed the figure of the sacred Lamb, and which is blessed by the pope, also receives this name. These Agni Dei are blessed on the Thursday after Easter, and are then distributed, this ceremony being usually confined to the first and seventh years of a pope's reign. The figure of a lamb bearing a flag marked with the device of a cross, and used as a sacred emblem, is also so called.

AGOSTA, or AUGUSTA, a seaport on the south-east coast of Sicily, in the province of Syracuse, and 12 miles N.N.W. of the city of that name. It was a place of some importance before the earthquake of 1693, which buried a third of the inhabitants in its ruins, and, at the same time, by supposed sulphurous vapours which issued from the ground, ignited the powder magazine and blew up the citadel. The port

is spacious but of rather difficult access. Its chief trade is in salt, and it also exports a little wine, oil, and sardines. Population 15,000.

AGOUARA, a name given to the Crab-eating Racoon (*Procyon cancrivorus*). See RACOON.

AGOUTA, or SOLENODON, a peculiar genus of insectivorous Mammalia, included in the Soricidæ or Shrew family (see SHREW). The agouta—not to be confused with the Rodent Agouti (which see)—is confined to Hayti. Its scientific designation is *Solenodon paradoxus*; and its teeth evince a peculiar structure, in that the two middle upper incisors are triangular in form and are separated from the lateral incisors, whilst the central lower incisors are small and narrow, and are placed between two long conical neighbours, each hollowed on its inner side into a deep groove. The snout is long and proboscis-like. The fur is coarse and of reddish colour, the tail being about 9 inches long, whilst the body itself is about 12 inches in length.

AGOUTI or AGUTI (*Dasyprocta*), a genus of Rodentia, allied to the Guinea-pig family, and generally attaining the size of a hare or rabbit. They have a large head, with a swollen tuberous nose, round short ears, and their feet bear hoofs rather than nails or claws. The body in the Common Agouti (*D. Agouti*) is covered with a coarse bristly hair, variegated black, yellow, and gray. The tail is merely a short naked stump or tubercle, and is concealed by the thick hair of the hinder quarters. Their hind are considerably longer than their fore legs. The front feet have four and the hinder feet three toes. These animals are often seen in a sitting posture, and carrying their food to their mouth after the manner of squirrels. They subsist entirely on vegetables, have a white and tender flesh, and in South America, where they abound, are a common article of food. They may be readily domesticated, but they are not very interesting. (See plate at article RODENTIA.)

AGRA, or AKBARABAD, a city of Hindustan, in the United Provinces of Agra and Oudh, capital of province of same name, on the right bank of the Jumna, 841 miles by rail W.N.W. of Calcutta. Much of it is now ruinous, but it still retains not a little of its original splendour, and has many ancient and lofty structures, among which the most celebrated are the imperial palace, built by the Emperor Akbar, the Motí Masjid or Pearl Mosque, the mosque called the Jama Masjid, and, above all, the Taj Mahal, a mausoleum of the seventeenth century, built by the Emperor Shah Jehan to his favourite queen. It is of white marble, adorned throughout with exquisite mosaics, and surmounted by tall minarets at its angles, and a lofty dome in its centre. It is surrounded by a fine garden, and is said to have cost over £3,000,000. There are several Protestant and Roman Catholic churches, a government college, and three other colleges or high-schools, besides a medical college. Cotton and salt are important articles of commerce, being sent down the Jumna in large quantities. The fort is large, and strongly built of red sandstone. During the great mutiny the Europeans were forced to retreat to it, and defended themselves with great gallantry till they were relieved. Agra is venerated by the Hindus as the birthplace of the sixth Avatar, or incarnation of Vishnu. Pop. in 1901, 188,022.—The province of AGRA has an area of 83,198 square miles, and a population (1901) of 34,858,705. (See UNITED PROVINCES.)—The division of AGRA comprises the districts of Agra, Muttra, Furruckabad, Minpooree, Etah, and Etawah; total area, 10,151 square miles, pop. 5,248,121. It is watered by the Ganges, Jumna, and Chumbul.

AGRAM, or ZAGRAB, a city in Hungary, capital of Croatia and Slavonia, on the left bank of the Save, from which it is about 2 miles distant. It is divided into three parts—the upper town, the lower town, and the episcopal town. The first rises in the form of an amphitheatre, on a slope, and is the finest portion of the town, containing the residence of the Ban of Croatia and Slavonia, several government buildings, the university, a theatre, and a fine promenade. In the lower town, which has handsome modern houses, are a Greek church, a synagogue, and a large square. The episcopal town contains the archiepiscopal palace, the cathedral, and the consistorial building. The cathedral is a lofty and spacious building, in a mixed style, the front being Byzantine of the eleventh century, and the body Gothic. The chief educational institution is the university (Francis Joseph University), opened in 1874. An active trade is carried on, and there are manufactures of tobacco, leather, and linens. Pop. (1880), 28,360; (1890), 37,529; (1900), 57,930.

AGRARIAN LAWS, laws enacted in ancient Rome for the division of the public lands, that is, the lands belonging to the state (*ager publicus*). From the earliest times the territory of Rome consisted in part of land that was not parcelled out among the citizens as their private property, but belonged to the state at large, and was let to private persons on payment of a tax. As the territory of Rome increased the public land increased, the land of conquered peoples being always regarded as the property of the conqueror. The whole of the freshly acquired territories did not usually remain *ager publicus*, being partly sold or distributed among colonists sent to occupy it. The right to the use of the *ager publicus* belonged to all who possessed the citizenship, and consequently in early times only to the patricians, the plebeians not being in possession of the citizenship. It was early the practice, however, to bestow upon the plebeians a portion of the public land as their own property, and this was recognized as their privilege, while to the patricians remained the privilege of occupying (on payment of the land-tax) the *ager publicus*. On the extension of the Roman territory the plebeians accordingly were entitled to a share in the good fortune of the state; but the patricians, who were in possession of the government, often resisted their claims, and retained the whole of the new territory in their own hands as *ager publicus*. Besides this they often evaded payment of the land dues, thus keeping down the revenue of the state, while they employed an undue number of slaves in the cultivation of the land, a practice detrimental to the interests of the republic as diminishing the number of free labourers. This state of matters gave rise to much discontent among the plebeians, and various remedial laws were passed, the earliest law that received the name of *lex agraria* being proposed by the consul Spurius Cassius in 486 B.C., though laws that were strictly agrarian in their character had been passed before this time. The law of Cassius proposed that half of the land which had been recently taken from the Hernicans should be given to the Latins, and half to the plebeians, that part of the public land occupied by the patricians should likewise be given to the plebeians, and that the payments for occupancy due by the patricians should be levied. The law was violently opposed and was not carried. Similar reforms continued to be insisted on by the plebs and evaded by the patricians, till the passing of the Licinian law in B.C. 367. By this law the extent of public land which each person could hold was limited to 500 *jugera* (a *jugerum* was equal to about $\frac{5}{8}$ths of an acre), the stock that each could feed on the public pasture was limited to 100 large and 500 small cattle,

and the surplus land was to be divided among the plebeians. This law worked with good effect for some time, but it came to be disregarded, and, in B.C. 133, Tiberius Gracchus attempted to revive it. (See GRACCHUS.) This attempt failed, and the land question was never really settled.

AGREEMENT. See CONTRACT.

AGRICOLA, CNEIUS JULIUS, lived from A.D. 37 to 93, and was a Roman general and governor in Britain, the greater part of which he brought under the dominion of Rome. His life (which extended through the reigns of the nine emperors from Caligula to Domitian) has been excellently written by his son-in-law, Tacitus, who holds him up as an example of virtue. This life of Agricola, in addition to its excellence as a piece of biography, contains information with regard to the state of Britain in the first century after Christ which possesses not only great interest but also great value. Agricola was born at Forum Julii (now Fréjus in Provence), and was the son of Julius Græcinus, a senator put to death under Caligula. He served his first campaign in Britain in 60, and after serving in Asia Minor and again in Britain, and governing Aquitania as prætor for three years, he was raised to the consulship in 77, and next year went to Britain as governor. Agricola was the twelfth Roman general who had been in Britain, but was the only one who effectually subdued it; partly by his consummate military skill partly by his policy in reconciling the Britons to the Roman yoke, and by teaching them the arts and luxuries of civilization. In his fourth campaign he built a chain of forts between the Forth and Clyde to help to keep in check the peoples to the north of this. His seventh and last campaign (A.D. 84) was marked by the total defeat of the Caledonians under Galgacus, at some place called by Tacitus *Mons Grampius* or *Graupius*. In this campaign his fleet sailed northward from the coast of Fife round Britain to the Trutulensian harbour (supposed to be Sandwich), thus for the first time proving that the country was an island. His death was either caused or hastened by the minions of the jealous tyrant Domitian.

AGRICOLA, JOHANN, German reformer, born in 1492, was one of the most active among those who propagated the doctrines of Luther. He studied at Wittenberg and Leipzig; was afterwards rector and preacher in Eisleben, his native city, and in 1526, at the diet of Spires, was chaplain of the Elector John of Saxony. He subsequently became chaplain to Count Albert, of Mansfeld, and took a part in the delivery of the Confession of Augsburg, and in the signing of the articles of Schmalkalden. When professor in Wittenberg, whither he went in 1537, he stirred up the Antinomian controversy with Luther and Melanchthon. (See ANTINOMIANISM.) He afterwards lived at Berlin, where he died in 1566, after a life of controversy. Besides his theological works he composed a work explaining the common German proverbs. Its patriotic spirit, strict morality, and pithy style, place it among the first German prose compositions of the time, by the side of Luther's translation of the Bible.

AGRICULTURE, in its strict signification, is the art of cultivating the earth for the purpose of causing it to produce more abundantly roots, plants, and seeds suitable for the sustenance or service of man, and for the support of the animals domesticated in his service. It was the first, and has always been the most extensively practised of the arts. 'It justly claims', says Lord Kames, 'to be the chief of arts; it enjoys, besides, the signal pre-eminence of combining deep philosophy with useful practice.'

In its accepted meaning, however, agriculture not only includes the tillage of the soil and the cultivation of crops, but also the rearing and feeding of all kinds of farm live stock, and in some instances the manufacture of the products of the farm into such forms as may be more convenient or more valuable for use or for sale. The manufacture of butter and that of cheese constitute recognized branches of the art of agriculture. The distinction between *arable* agriculture, which includes the cultivation of the ground and the growth of crops, and *pastoral* agriculture, which comprises merely the feeding and management of the flocks and herds of the farm, has been observed since the earliest times: 'Abel was a keeper of sheep, but Cain was a tiller of the ground'. In modern times, and probably in some degree at all times within the historical period, the practice of arable agriculture has been commonly associated in greater or less degree with the keeping and tending of live stock; but over immense tracts of the world's surface that are unfitted for arable cultivation, the practice of pastoral agriculture still prevails, as in the ancient days, wholly unmixed with the plodding labours of the husbandman.

All the great nations of antiquity who had attained to any degree of civilization, the Chinese, the Assyrians and Babylonians, the Phœnicians, and the Egyptians, appear to have held the art of husbandry in high esteem, and numerous references to agriculture and its practices are found scattered throughout all ancient literature. The agricultural practices of Palestine are the subject of repeated allusions in the books both of the Old and New Testaments, and among the Greeks agriculture was described by such authors as Hesiod and Xenophon. The Romans attained to a very high perfection in agriculture, and the Latin literature devoted to this subject alone appears to have been extensive. Its authors include, among others, the names of Columella, who wrote a complete treatise on agriculture in twelve books, Virgil, whose Georgics constitutes the most famous of the classical poems on agriculture, as well as Varro, Pliny, and others. Rome's powerful rival, Carthage, is said to have even surpassed the Romans in the art of agriculture.

It was in all probability during the Roman occupation that agriculture in Britain first attained to the position of an art, but during the disturbed period of the Anglo-Saxon conquest its practice fell into inevitable neglect, and the Roman principles of culture were forgotten through disuse. When society became more settled, agriculture again revived, especially after the introduction of Christianity among the Anglo-Saxons. Under the feudal system introduced by the Normans, agriculture was long neglected in favour of war and the chase, crops were sacrificed to game, and labourers were starved that nobles might have sport. For several centuries agriculture made no progress, and its English literature did not commence till nearly five hundred years after the battle of Senlac. This literature began with Sir Anthony Fitzherbert's Book of Husbandry, published in 1525, which was followed half a century later by Tusser's metrical Five Hundred Points of Good Husbandry.

About the middle of the seventeenth century the field cultivation of clover and of turnips was introduced into England by Sir Richard Weston, and gradually extended. Blith's English Improver was published in 1649, and the Legacy or Discourse on Husbandry, by Hartlib, a follower of Cromwell, and a friend of Milton, in 1650. By the end of the century a number of other works on agriculture had been produced, and the art was once more practised with a skill perhaps not inferior to what had existed in the days of the Roman occupation.

In the succeeding century still greater progress

was made, of which the first steps were due to Jethro Tull, a gentleman of Berkshire, and to Lord Townshend. In Tull's Horse-Hoeing Husbandry, published in 1731, was first advocated the system of sowing crops in drills or rows so wide that cultivation could be carried on between them. To Townshend belongs the credit of the introduction of the Norfolk or four-course rotation, which is still widely practised, and which has formed the basis of all the rotations of crops since adopted on light and medium land. The next great name in British agriculture is that of Robert Bakewell (1725–94), who discovered the method of improving live stock by judicious mating and selection. He formed the new Leicester sheep, which surpassed all pre-existing breeds in early maturity and fattening propensity, and thus exemplified the principles by which all breeds of farm live stock have since been improved. His methods were soon after applied with like success to the Southdown, the Cheviot, and other breeds. Bakewell's Leicesters were also extensively used to improve other sheep breeds by crossing. The same principles, applied in the end of the century to cattle by the brothers Colling, produced from the native Teeswater or Durham the most valuable of all breeds of farm live stock, the celebrated Shorthorn. The improved Shorthorn has been even more extensively used in the improvement of other breeds of cattle than the Leicester in sheep. Herefords were subjected to similar selective treatment by Tomkins.

Other notable events of the eighteenth century were the rapid extension of the cultivation of the potato, which only attained to a position of importance among field crops, in England about the middle, and in Scotland in the latter half of the century. In this period were also founded the leading agricultural societies, which have exercised such a powerful influence in the education of farmers and the advancement of agriculture. These included the Highland and Agricultural Society of Scotland, founded in 1774; the Bath and West of England Agricultural Society, founded three years later; and the Smithfield Club, founded in 1793. In the same year there was established, chiefly through the exertions of the celebrated Sir John Sinclair, the first Board of Agriculture, which continued till 1816. Sir John Sinclair was its first president, and its first secretary was the famous Arthur Young, whose graphic descriptions of agricultural practices, both at home and abroad, contributed in no slight degree to the general improvement of agriculture.

With the beginning of the nineteenth century agriculture in Britain entered on an entirely new era. Prior to this century agriculture was an empirical art in which changes and improvements were effected slowly and with difficulty. At its close agriculture is a science as well as an art, and more changes have been effected in its methods and practices within the last 100 years than during the whole of the preceding eighteen Christian centuries. The remarkable discoveries made in the knowledge of natural science, especially in such subjects as chemistry, bacteriology, botany, and natural philosophy, have been applied with enormous benefit and far-reaching effect to the practices of agriculture, and have enabled a great increase to be made in the productive capacity of land. Numerous new crops have been introduced into cultivation, such as swedes, mangels, kohl-rabi, Italian rye-grass, and others, while the principles of the improvement of varieties of crop by selection, and the formation of new and more vigorous varieties by crossing have been applied with incalculable advantage alike to cereal and to root crops. Many new agricultural implements have been invented, while the older have been improved and rendered more effective. The power of steam has been called into the service of agriculture, both in the operations of the field and more extensively in those of the barn and the dairy. The utilization of wind and water power has also been rendered more practicable for certain purposes, and the whole labour operations of agriculture have been rendered both cheaper and more efficacious. The diseases of crops have been investigated, and preventive and curative treatments have been discovered, and successfully applied. Remedies and mitigations have also been discovered for damages inflicted on crops by insects. The diseases of stock have been studied in the light of advanced medical and scientific knowledge, and are now subjected to an infinitely more skilful and successful treatment.

On the whole, the most notable agricultural discovery of modern times was that of the method of thorough drainage. The advantages of drainage had been in part previously understood, and some methods either imperfect or applicable only in special circumstances had been practised to a limited extent. The discovery of a method of drainage at once simple, cheap, effective, and universally applicable was made by Mr. Smith, of Deanston, Perthshire, in the year 1823, and was published by him in 1834. It is impossible to over-estimate the immense boon that this discovery has conferred on the agriculture of the world. It is a commonplace of agricultural science that 'drainage is the foundation of all successful arable agriculture'. By its means the cultivation of a vast area of wet land has been rendered practicable, while the productive power of the greater part of the arable surface soil of the world has been permanently raised.

Next to the discovery of thorough and systematic drainage the great agricultural achievement of the century has been the vast extension of the practice of manuring crops, and the establishment of its true theory. Farmyard manure and various natural manures had been applied to crops from time immemorial. It was left to the nineteenth century to discover that their efficacy depended, as a rule, in their contents of the chemical elements nitrogen, phosphoric acid, and potassium, with lime, and that any materials that supply these substances in available forms would make efficacious manures. The use of ground bones was accidentally discovered early in the century, and in 1843 Sir John Lawes, acting on the recommendation of Baron Liebig, showed how their efficacy could be increased by dissolving them in sulphuric acid. The value of mineral phosphates treated in the same fashion was subsequently proved, and the manufacture of superphosphate is now carried out on a very extensive scale, and forms one of our great industries. Additional sources of manures have been discovered from time to time, and the trade in them has now assumed very large dimensions. The value of the imports of manures into the United Kingdom in 1908 amounted to fully £3,000,000, which included imports of nitrate of soda from great natural deposits in Chili and Peru, kainit from the Stassfürt mines in Germany, guanos from islands of the South American and African coasts, bones from India and South America, and mineral phosphates from the United States and Canada, and from France, Spain, Russia, and other countries. In the latter part of the century Hellriegel succeeded in proving that crops of the clover order (Papilionaceæ) were assisted in obtaining their nutrition by bacteria contained in nodules on their roots, and suggestions as to the rotations of crops and their manurial treatment have arisen from this discovery, which may lead in

the twentieth century to some important modifications in the existing practices of agriculture.

From the middle of the nineteenth century till after the year 1870 the agriculturists of Britain, in common with the industrial and commercial classes, enjoyed a period of almost unprecedented prosperity, but about the year 1873 there commenced a period of extreme depression, which has not yet come to an end, though the severity of its effects has been in some degree mitigated. During this period the value of all sorts of agricultural stock and produce, and of agricultural land in all parts of the United Kingdom has undergone a heavy depreciation. Rents have fallen variously from 25 to 50 per cent or even more, and many thousands of acres of clay lands in England have been thrown entirely out of cultivation. Thousands of farmers have been ruined, and many land-owners have been reduced to poverty, while the total capital invested in land and in agriculture has undergone an enormous shrinkage. Various causes have contributed to produce these disastrous results, but prominent among them has been the increasing 'foreign competition', produced by the rapid and continuous growth in the amount and variety of articles of agricultural produce, especially wheat and flour and dead meat, sent into the British markets from abroad. In the year 1909 the value of the wheat imported was £45,272,000; barley, £7,144,000; oats, £5,438,000; flour, £6,370,000. Maize, which of course is not a British crop, was imported to the value of £12,123,000. The meat imported, including beef and mutton (partly chilled or frozen), bacon, hams, &c., had the total value of £41,000,000; the importation of dairy produce has also become enormous, butter being imported in 1909 to the value of £22,425,000, cheese to that of £6,830,000; eggs, £7,234,000; margarine, £2,240,000. Among the chief contributors to this immense importation are the British colonies and the United States, but numerous other countries also send consignments to swell the total. With the great extension of wheat-growing in Canada, the Argentine Republic, and elsewhere, there seems little reason to expect any relaxation in the competition that the farmers of the United Kingdom have to meet.

The stress of this foreign competition, combined with other causes, has produced great changes in British agriculture. The most conspicuous of these has been a gradual and steady reduction of the area of arable land, and a corresponding extension of the acreage under grass. In the thirty years from 1873 to 1903, the area of land under cultivation in the United Kingdom fell from about 17 millions to less than 13 millions acres, showing a diminution of about 25 per cent. Wheat alone fell from 3,740,000 to 1,621,000 acres; all the other corn crops showed a diminished acreage, and the area under green crops fell by about one million acres. Clovers and grasses under rotation underwent a similar reduction, while the area of arable land laid down in permanent pasture showed a corresponding increase. The process of change, which seems latterly to have been checked, is that of the transformation of Britain from a crop-growing into a stock-keeping country. A natural consequence of this process has been a great change in the numbers of cattle kept in the country. The total cattle of all ages in the United Kingdom in 1867, amounted to less than 8 millions, and in 1910 their number had increased to nearly 12 millions. Sheep, however, in the same period declined in numbers from 33,800,000 to 31,165,000.

Perhaps the most notable characteristic of the agriculture of Britain as it at present exists is the great diversity of the practices and systems of farming that prevails within its boundaries. This is due in part to variations in the climatic conditions of the different parts of the kingdom, to its undulating surface, and its frequently changing elevations; to great differences in the amount and distribution of the rainfall, which is heavy in Ireland and along the western coasts of Britain, and comparatively light on the eastern, especially on the south-eastern seaboard; to differences in the average summer temperature, which is much higher in the southern provinces of England than in Scotland; and to the length of the summer, which lasts for a perceptibly longer period in the southern than in the northern parts of the kingdom. One very patent cause of the prevailing diversity of agricultural practice is the extreme variation that occurs in the character of the soils that form the surface of the country, since in Britain almost every one of the known geological rock formations crops out in succession on the surface and gives rise to a different kind of soil.

The crops grown in Britain are commonly divided into cereal, root, and forage crops, along with pasture plants, and some other special crops which do not fall within this classification. The chief cereal crops of Britain, which occupy about 8 millions of acres, are wheat, oats, and barley, along with bere, rye, beans, and peas. Turnips and swedes, potatoes, and mangels constitute the chief root crops, and cabbages, kohl-rabi, and rape also occupy large areas. The forage crops grown are for the most part of the leguminous order, the chief being vetches or tares, lucern, sainfoin, and red clover. Temporary pastures and hay fields consisting of various mixtures of grasses and clovers are cultivated on arable land alternatively with the cereal crops for a shorter or longer number of years according to the rotation followed. The oat is by far the most extensively grown of the cereal crops. It is the chief cereal of Ireland, and in Scotland it occupies about three-fourths of the whole area devoted to cereal cultivation. In England it is cultivated on about one-third only of the total cereal area. Barley occupies over one-fourth of the cereal area in England, but less than one-fifth in Scotland. It is grown to great perfection in Norfolk and Suffolk, whence the finest malting barleys are usually obtained. In the northern parts of Scotland bere is very commonly substituted for it. Wheat in England covers a smaller area than barley, occupying nearly one-fourth of the total cereal acreage. It is the chief and often the only cereal grown on the stiff clays, and its power of standing drought and its requirements in temperature fit it for cultivation in the warmer and drier parts of the kingdom. In Scotland and Ireland wheat occupies a position of small importance.

The root crops in Britain are cultivated on about four millions of acres, and one-half of that area is occupied by turnips and swedes. In Scotland these crops are grown on about three-fourths of the total root area, the moist and cool climate of that country being as favourable to the turnip as to the oat crop. Mangel, on the other hand, which flourishes best in a warm and dry climate, is cultivated on a small area only in Scotland, but largely replaces the turnip and swede in the agriculture of the south of England. Kohl-rabi also has its cultivation exclusively confined to the stiffer soils of the centre and south of England, and is not known in the north. Hops are more largely grown in Kent than in all other counties together, but they have also some importance in Sussex, Hereford, Worcester, and a few other counties. Flax is chiefly grown in the north of Ireland. The potato is by far the most important root crop of Ireland, and in Scotland it is

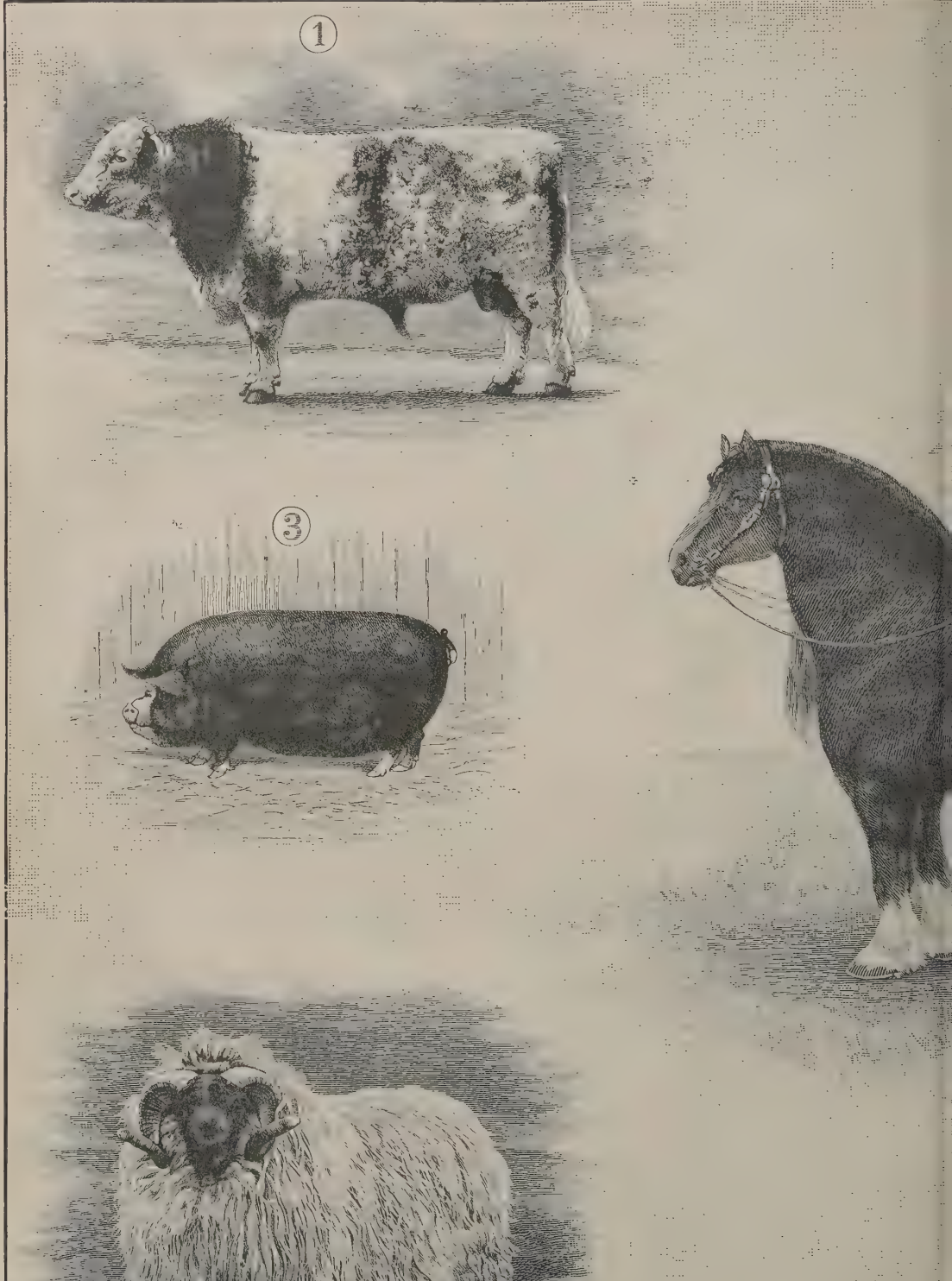


Fig. 1. Shorthorn Bull, from A. Druce's "Food Supply", by permission of Messrs. Charles Griffin & Co., Limited. 2. Ayrs
by permission of the Editor. 4. Clydesdale Horse, from "Famous Clydesdale Sires" by Archibald MacNeilage, by
6. Blackface Ram, from a photograph kindly lent by Mr. C. Howatson, Glenbuck. 7. Lincoln Ram, from the "Liv

om "The Book of the Dairy", Blackie & Son, Limited.
the Secretary of the Highland and Agricultural Society.
nal", March 25, 1898, by permission of the Editor.

3. Berkshire Pig, from the "Live Stock Journal", March 25, 1898,
5. Goat, from "The Book of the Dairy", Blackie & Son, Limited.

cultivated on about one-fifth of the whole green crop area. In England it occupies a still smaller proportion, as it cannot be successfully grown either on its clays or its chalks, and it proves a very unsafe and unremunerative crop in districts that are liable to suffer from drought. No less than about 300,000 acres of stiff clay land on which roots can only be grown with difficulty are kept annually under bare fallow.

The rotations in which the crops are grown are determined by various conditions. On the lighter soils, the typical rotation is a four-course consisting of two cereal crops with a root and a forage or a pasture crop alternating. This rotation is extended to a five, six, or seven course by allowing the land to continue in pasture for any desired number of years. The prominent crops on light lands are turnips and swedes, barley and rye, and the grasses and clovers. On chalk soils and marls all leguminous crops are suitable, such as sainfoin, lucerne, peas, beans, vetches, and trifolium. Potatoes are chiefly grown on the medium soils, but all sorts of crops can be successfully grown on them. On such soils a cereal crop is frequently grown every second year in alternation with root and forage crops, and the land is never laid down to pasture. On the stiff clays, wheat, beans, cabbages, rape, and mangel are the most suitable crops. The expense of tillage on stiff clays is so great, however, that large areas have now been sown down to permanent pasture.

The purposes for which the various crops are grown serve as a basis for an arrangement of the various practices of arable agriculture into a simple popular classification of systems of husbandry. These comprise the *dairy farming* system, the *suburban farming* system, and the *feeding* or *fattening* system. The *pastoral* or sheep farming system is that pursued on the mountains, moors, and permanent pastures on which no land is broken up by the plough.

The *feeding* or *fattening* system is followed on all farms on which the roots and forage are utilized chiefly in the fattening of sheep and cattle for the butcher. Most generally on farms of this class the growth of cereal grains for sale forms one of the chief objects as well as the production of beef and mutton. This is the prevailing system of farming on most good arable lands all along the eastern coast and in the central districts of Great Britain, and its practice extends more or less into all parts of the island, being associated also on many farms with the rearing of young stock.

The *suburban farming* system is a direct result of that concentration of the population of Britain into large towns and cities, which constitutes one of the most notable social phenomena of modern times. The farms in the immediate vicinity of populous centres have modified their practice in order that they may be able to supply the roots, fodder, and vegetables required by the human, equine, and bovine population of the cities. For this purpose the four-course rotation is commonly preferred, and the crops grown include oats and wheat for their straw as much as grain, and turnips, potatoes, and various kinds of cabbages, besides Italian rye-grass to provide green forage. An important feature of the practice of suburban farming is the facility it affords for the purchase of large quantities of stable and street manure from the cities, by the free use of which the farms are kept in a high state of fertility. On many suburban farms horticultural practice is combined with the methods of ordinary farming, and vegetables, flowers, and fruits are grown in extensive fields in alternation or side by side with the ordinary farm crops. In the counties contiguous to London whole districts of country are devoted to the practice of what might properly be called *garden farming*.

Dairy farming as a system may be subdivided into three separate branches, according as the farms exist for the production of milk for direct sale, or for the manufacture of cheese, or of butter. Butter-making, however, is not pursued to any great extent in Britain as a separate branch of dairying, but is commonly associated either with the selling of milk or the rearing of cattle. This is the almost universal farming system of Ireland. In its arable districts it is essentially a calf-rearing and a butter-making country. The moisture of its climate and the consequent productiveness of its pastures give it special adaptation for dairying, while the small size of the farms prohibits cheese-making, the small population limits milk-selling, and the large rainfall, the poverty of the soil, and the distance from markets are unfavourable to the growth of cereals and the fattening of cattle. The chief agricultural exports of Ireland are butter and young store cattle to England and Scotland. In the milk-selling branch of dairying there has been a very great development in the last quarter of the century, This has arisen partly from the growth of the national population, and partly from the increased use of milk in cities as an article of diet. The enlarged demand has produced a corresponding increase in the number of farms on which the whole system of cropping and management is adapted to the production of milk for sale. The greater number of farms in the neighbourhood of large cities that are not devoted solely to the growth of crops for sale are now engaged in the production of milk, while the conveniences provided by railway communication, and the low and uniform rates charged by the railway companies also enable the supply of milk for the large cities to be drawn from the most remote districts of the country.

The manufacture of cheese for sale is confined exclusively to special districts in England and the south-west of Scotland, while outside of these districts it is wholly unknown. In England, Gloucester, Somerset, Leicester, and Cheshire are important cheese-making counties, and in Scotland, Ayrshire, Wigtown, and Kirkcudbright. The most extensively manufactured cheese is the Cheddar, named from the village of Cheddar in Somerset, a hard cheese of large size, which has been famous for at least three centuries, and is now not only the chief cheese of its native county, but also of Scotland, of Canada, of the United States, and of New Zealand. Another cheese of world-wide repute is the Stilton, a small cheese of a rich creamy character which originated in Leicestershire, and which is said to be still made in its greatest perfection in that county. Other English cheeses are the Cheshire, the Gloucestershire, the Cotherstone, the Dorset, and the Slipcote.

The farm live stock of Great Britain comprises horses, cattle, sheep, pigs, goats, and poultry. The total number of cattle of all ages in the United Kingdom amounts to about 11 millions. There are about twenty separate breeds, which are commonly divided into Fattening breeds and Dairy breeds, the first of these being afterwards subdivided into Horned breeds and Polled or hornless. The most valuable is the Shorthorn, which combines in a greater degree than any other breed the best properties of both fattening and milking cattle. Bulls of this breed have been extensively used for the improvement of other breeds of cattle not only in Britain, but in all parts of the world, and pedigree animals of choice strains command very high prices. Of similar value to the Shorthorn for fattening purposes are the Aberdeen-Angus and the Hereford. The latter is a large heavy breed with peculiar and characteristic red and white markings. The Aberdeen-Angus is a black breed of large size and very fine symmetry. It has

the advantage of being hornless, and as a house-fattening breed it rivals if it does not excel the Shorthorn. A breed of very similar appearance is the Galloway, which is the hardiest of the larger feeding breeds. Crosses of this breed with the Shorthorn, known as Blue-greys, make excellent feeding cattle, and yield the best butchers' carcases. Another Scotch breed, the West Highland or Kyloe, has the distinction of being the handsomest of British breeds of cattle. Other useful fattening breeds are the Devon, the Sussex, and the Longhorn.

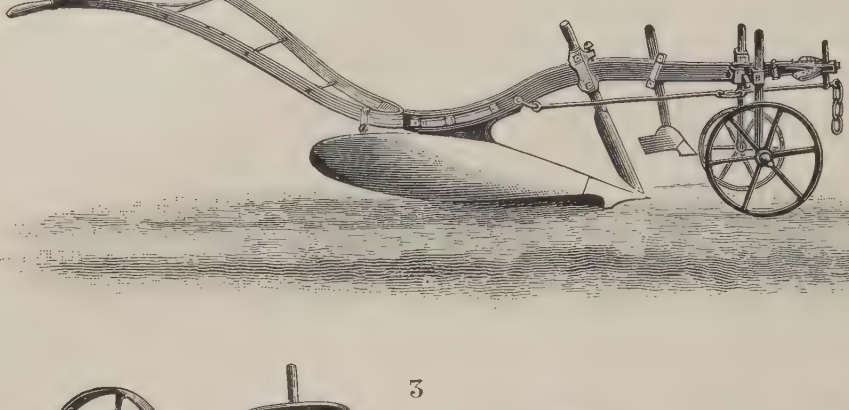
The chief dairy breeds are the Ayrshire, the Jersey, the Kerry, and the Shorthorn, with crosses of these and other breeds. The Jersey is a breed of the Channel Islands which yields a milk peculiarly rich in butter fat, from which can be made butter of the richest colour and quality. The Kerry is the smallest of the dairy breeds, and with its variety, the Dexter, forms the only native breed of Ireland. It is a small, hardy black animal that thrives on poor keep and yields rich milk. The Ayrshire is a medium-sized dairy cow of good form. It is noted for the symmetry of its milk vessel, and is regarded as the best average milk-producer of all the breeds in proportion to its size and consumption of food.

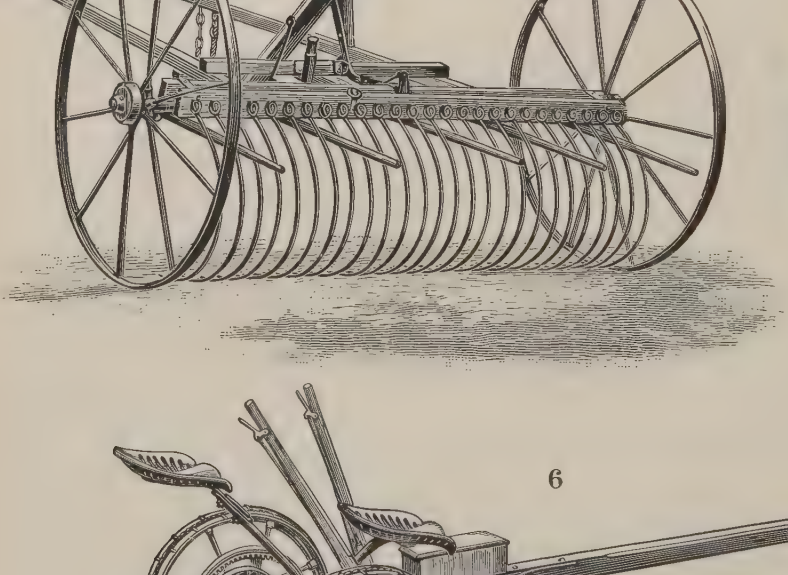
The total numbers of sheep in the United Kingdom have fluctuated for a considerable period round 30 millions of all ages. These occupy a far greater extent of the land surface of the country than all other breeds of live stock together. The whole of the heath and mountain land of the kingdom, with a great part of the permanent pasture and the rotation pastures are stocked chiefly with sheep, and the crops of the arable land are also utilized for their support. Relatively to their total area, Scotland and Wales keep the greatest number of sheep. England follows at a considerable distance, and Ireland lags far behind. Except on its mountain ranges the farms of Ireland with their small fields are not well adapted for sheep. The breeds of sheep are about as numerous as those of cattle. They are divided usually into Mountain breeds and Lowland breeds, and the latter are again subdivided into Short-woolled and Long-woolled. Of the mountain breeds the most important is the Scotch Blackface, a long coarse-woolled, horned, and very hardy breed that occupies all the higher mountain ranges and poorest pastures of Scotland. Others are the Cheviot, the Louk, the Herdwick, and the Welsh Mountain. The Lowland breeds are usually larger sheep, and they excel in the production both of mutton and of wool. One of the best known of these breeds is the Leicester, a white-faced sheep of medium size, which has been largely employed in the improvement of other breeds by crossing. A larger and perhaps superior breed is the Border Leicester, also a long-woolled and hornless white breed, extensively kept in the south of Scotland. The largest of English sheep breeds is the Cotswold, a hardy and strong sheep that carries a heavy fleece. Almost as heavy is the Lincoln, which along with a weighty carcase yields wool of great length and high quality. Other breeds are the Devon and the Romney Marsh. Perhaps the largest of all sheep is the Roscommon, which has also the distinction of being the only breed of Irish origin. The Down breeds of England constitute a class which is distinguished from all other sheep by well-marked characteristics. They comprise the Sussex or Southdown, the Shropshire, the Hampshire, the Suffolk, and the Oxford Down. These breeds vary in size and in some other points, but they are all compact, hornless sheep, covered with fine and close wool, and with brownish-coloured legs and faces.

The number of pigs kept in the United Kingdom fluctuates to a greater degree than that of any other kind of live stock, but it usually circles round four millions. Most of the pigs kept are mongrels or crosses, and there are only a few pure breeds, which are classified by size and colour. The largest breed is the Large Yorkshire, a white coarse pig that is capable of attaining to a great weight. Other white pigs of good size are the Middle Yorkshire and the Scotch White. The Tamworth is a medium-sized hardy pig of variable colour. The smaller pig breeds are distinguished by their symmetry of form and aptitude to fatten. They comprise the Small Yorkshire, the Essex, the Dorset, and the Berkshire. The most notable of these is the Berkshire, which has been exported in large numbers to all parts of the world to cross with larger and coarser breeds.

The total number of horses employed in agriculture in Britain exceeds one million, but the breeding of horses for city use, for coaching, driving, hunting, and for draught, forms an important branch of the agricultural practice of many parts of Britain. Horses are commonly classified as heavy and light breeds. The latter include race-horses, coach and hunting, and driving horses, and all ponies. Besides the Thoroughbred or Race-horse, the most important of the light breeds are the Cleveland, a handsome coach-horse of Yorkshire, the Hunter, which is extensively bred in Ireland, and the Hackney, which is specially distinguished for its high-stepping action and splendid trotting speed. The pony breeds include the Welsh, the Exmoor, the New Forest, and the Shetland. The most interesting of these is the Shetland, a very symmetrical pony, bred in the islands whose name it bears. It is a diminutive but powerful, hardy, and sagacious animal, and is without rival as a pony for children. The heavy breeds of draught horses comprise the Shire, the Clydesdale, and the Suffolk. The latter is a chestnut or sorrel horse, with weighty and powerful body set on light clean legs. More important draught breeds are the Shire and the Clydesdale, the former of English and the latter of Scottish origin. Both breeds have been greatly improved within the past thirty years by selection, careful mating, and partial intercrossing. The Shire is a powerful heavy horse with great depth and weight of body, and with thick strong legs covered with a large quantity of rough hair. The Clydesdale is usually a lighter bodied animal, but he excels in the size of his feet, the flatness and hardness of his bones, and his quicker and more elastic action.

It is very generally admitted that in proportion to the extraordinary progress in the mechanical arts that has been made since the invention of the steam-engine, improvements in the application of mechanical power to the operations of agriculture have been but slowly effected. Nevertheless new implements and machinery have been steadily introduced, and the older have been modified in form in such a manner as to secure greater efficiency and economy. In recent years there has been a considerable importation into the United Kingdom of American agricultural machinery and implements, which are preferred to those of home manufacture, partly because they are cheaper, and partly also because they are frequently handier and lighter, and make more effective substitutes for manual labour, of which the growing scarcity, brought about by the rural depopulation, has rendered the urgency for labour-saving appliances almost as great in Britain as in some of the sparsely-peopled states of western America. In the implements employed for the mere tillage of the soil, no very great changes have been effected within the century. The *plough* still remains the chief implement employed for the primary tillage of the soil. The





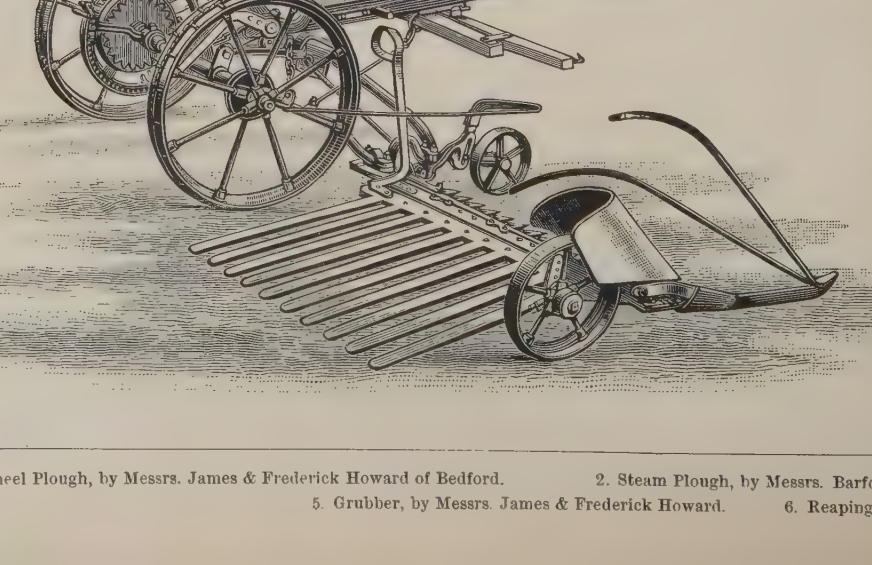


Fig. 1 Wheel Plough, by Messrs. James & Frederick Howard of Bedford. 2. Steam Plough, by Messrs. Barford & Pe
5. Grubber, by Messrs. James & Frederick Howard. 6. Reaping Machin

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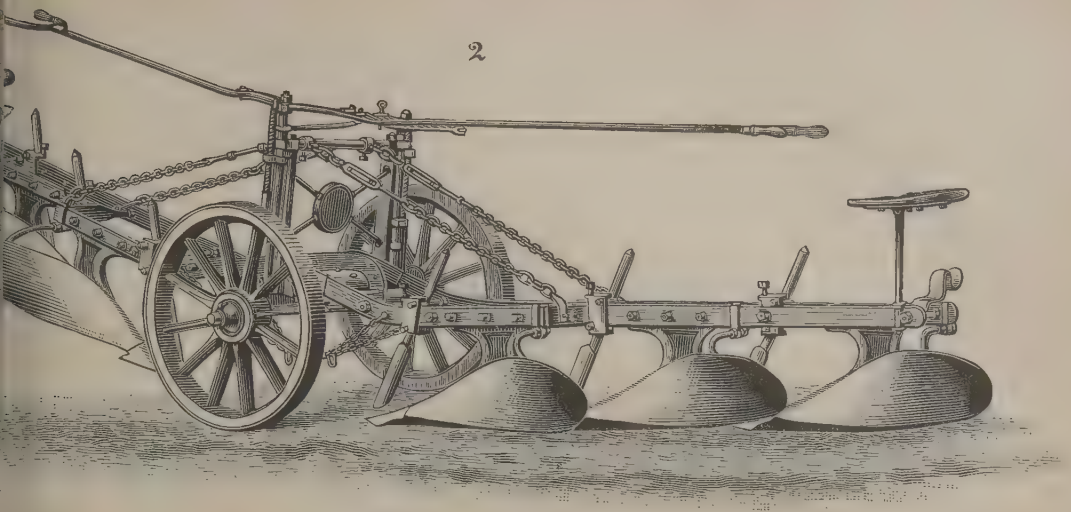

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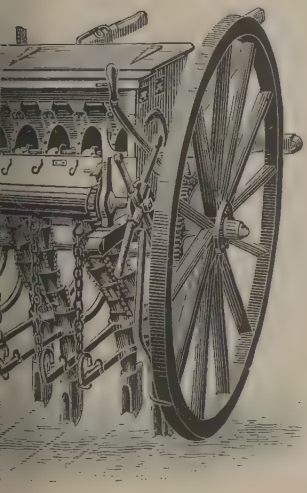

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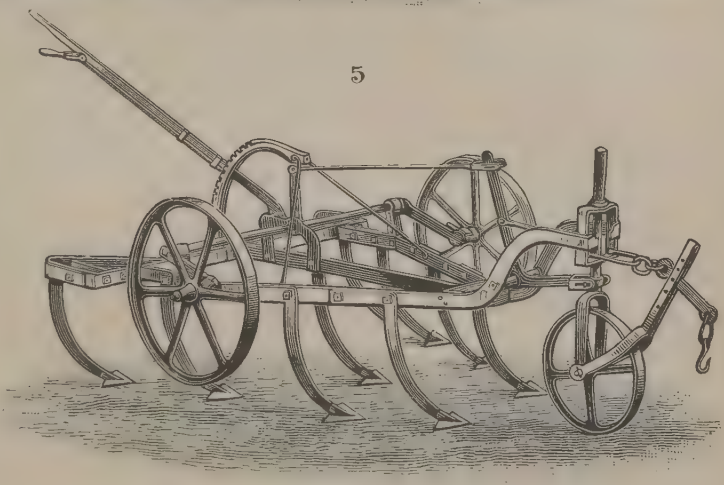

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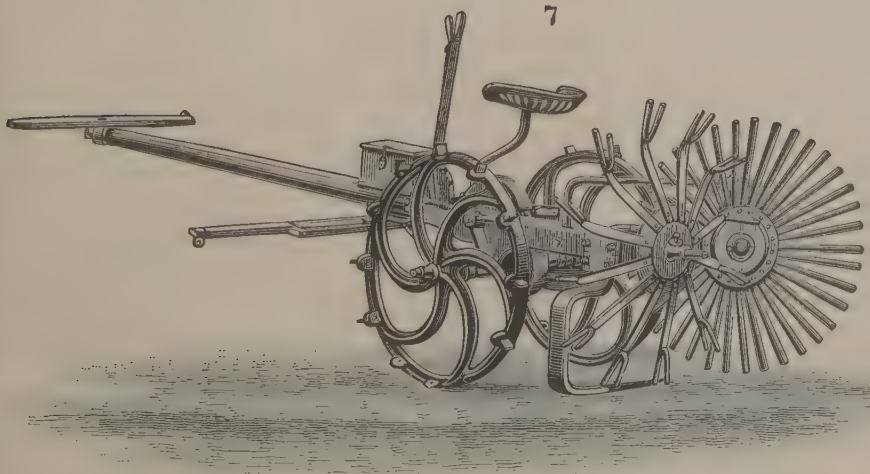


rough. 3. Horse Rake, by same Makers. 4. Corn and Seed Drill Sower, by Mr. James Coultas of Grantham.

ers. 7. Potato Raiser, by Messrs. Powell Brothers & Whittaker, Wrexham

swing-plough is still largely preferred in Scotland, the *wheel-plough* in England. *Double-furrow ploughs* have also been made which turn over two furrow-slices at once, but they have met with limited favour. There are numerous ploughs for special purposes, such as the *turnwrest plough*, the *subsoil plough*, the *paring plough*, and others. The form and weight of all ploughs are modified in the different districts of the country to suit the various kinds of soils. Large numbers of chilled steel American ploughs are now in use. *Digging-ploughs* have also been widely substituted for the common plough. Their mould-boards are so shaped that they not only turn over the furrow-slices, but also break down and pulverize their surface. *Steam-diggers* have also been invented which are intended to displace ploughs entirely. These machines consist of light traction-engines fitted with forks behind, which dig the land over which the machine has been travelling. Their tillage is much more thorough than that given by the plough. For the more complete pulverization of the soil that has been turned over by the latter implement, recourse is commonly had to *rollers*, *grubbers*, *cultivators*, and *harrows*. The *rollers* and *clod-crushers* crush down and break hard lumps, while the *cultivators*, by means of a series of sharp-pointed tines or teeth, stir and break the soil to a moderate depth, and tear out weeds. *Harrows* of various patterns are used to complete the pulverization of the surface. They are furnished with short tines, or teeth, which tear the smaller lumps of earth to pieces. One of the most useful implements is the *chain-harrow*, in which links take the place of tines. It is employed chiefly for collecting weeds on the surface after they have been separated from the adherent earth by the other cultivators and harrows. The implements used in steam cultivation are in principle similar to those employed in horse tillage, but are much stronger and heavier, and are capable of doing more thorough work. Steam-power is, however, much more extensively employed for driving threshing-mills and food-preparing machinery in barns than for tillage. The barn machinery comprises *cake-breakers* and *corn-bruisers*, as well as *chaff-cutters*, in which hay and straw can be cut into short lengths to mix with pulped roots; *root-slicers*, which cut them into slices; and *root-pulpers*, in which the roots are torn into small shreds.

In the cultivation of the crops a large number of special machines and implements are used. The seeds of the cereals are very commonly sown by the *broadcast sower*, which discharges the seed loosely but regularly from an oblong box carried on wheels, or by the *drill-sower*, which deposits the seed in regular rows a few inches deep in the soil. Weeds between the rows of young corn can be destroyed by the *horse-hoe*, and cultivation between the rows of root crops is carried on by means of numerous forms of *drill-grubbers*, *hoes*, and *scarifiers*. Most of the root crops are raised by hand, but potatoes are very commonly raised by means of special *potato-diggers*, which strike the tubers out of the soil by means of a rapidly-revolving fork. The cereal crops are now entirely cut by *reaping-machines* and *self-binders*. The reaping-machines may be *manual-delivery* or *self-delivery*. These machines are now, however, being largely displaced by the *self-binding harvester*, which has been brought to a state of high efficiency in the closing decade of the century. This machine cuts the corn, separates it into sheaves, binds each sheaf firmly with string, and then throws it off. Under conditions favourable to its action, this machine enables the cutting of the crops to be effected with a minimum of manual labour in very brief time and at a much reduced cost. Substantial economies have also been effected by the introduction of labour-saving machinery for hay-making. The *hay-maker* and *hay-tedder* toss and turn over loose hay much more cheaply and rapidly than can be done by hand, and the *horse-rakes* and *hay-collectors* quickly collect it again into rows and heaps. By means of the *hay sledge* or *rick-lifter* whole ricks can be removed from the fields without handling, and by means of the *horse hay-forks* they can be quickly transferred to the tops of the highest stacks.

No national system of agricultural education exists in Britain, and it is in part due to the greater encouragement given by the governments of other countries to some branches of technical instruction in agriculture that foreign competition has been so keen, especially in articles of dairy produce. In Germany the subject has long been recognized as one of great importance, and there are established in some of its provinces a complete series of agricultural schools, rising gradually from elementary schools up to the standard of such institutions as those of the Halle Agricultural Institute or the Hohenheim Agricultural Academy, to the latter of which is voted a state grant of over £5000 per annum. In France there exists a similar system of lower and intermediate schools, all supported by state grants, which prepare pupils for entrance into such large and splendidly-equipped colleges as the Institut National Agronomique, which has a state grant of over £10,000 per annum. In Belgium, Holland, Sweden, and Denmark exist also more or less complete systems of agricultural education, all supported in whole or in part by the state. In some countries, as in Denmark, special encouragement has been given to dairy schools capable of giving instruction in butter- or cheese-making or both. In America and in the British colonies the importance of providing complete courses of instruction in agricultural science has also been fully appreciated, and agricultural colleges and experiment stations, liberally endowed by the state, have been instituted both in British North America and in the United States. In the latter country there exist about fifty agricultural experiment stations, many of which are associated with teaching colleges. These are aided by state grants of public funds, which amount in most cases to from £3000 to £5000 per annum.

In the United Kingdom an attempt to establish a national system of agricultural education was made in Ireland as early as 1831, when the Commissioners of National Education founded, at the Albert Institution at Glasnevin, near Dublin, a school of agriculture, with a farm attached. This institution has proved very successful, as has also the Munster Dairy School, near Cork. The principles of agriculture are also taught in rural schools. In Britain there was founded in 1790 a chair of agriculture in the University of Edinburgh, and in 1845 there was established at Cirencester, in Gloucestershire, an Agricultural College, for which a large capital was provided by private subscription. Prior, however, to the year 1882 very little was done by the state for agricultural education, but in that year the principles of agriculture were included by the Science and Art Department as one of the subjects on which teachers could earn grants, and this aid gave a great stimulus to the teaching of elementary agricultural science in evening classes and rural schools. At the same time a lectureship on agriculture was founded in the Normal School of Science, London, and courses of instruction were provided for teachers. The pressure of foreign competition in dairy produce also induced dairy associations and agricultural societies to provide courses of itinerant dairy in

struction, and these led to the formation of a few fixed dairy schools. In the year 1891 certain funds accruing under the Local Taxation Act (1890) were handed over to town and county councils to be devoted either to the reduction of local rates, or to the promotion of technical education, and the new Board of Agriculture, formed in 1889 for the purpose of watching over and fostering the interests of agriculture, was also accorded an annual vote from the Treasury to be expended in aid of agricultural education and research. In the year 1897 further grants of state funds were made for the same purposes. The encouragement afforded by these grants of public funds has given a remarkable stimulus to agricultural and dairy education. Complete courses of instruction in higher agricultural science have now been provided either in separate colleges or in departments of existing colleges and universities in the leading educational centres in the country, as at Bangor and Aberystwyth, Cambridge and Reading, Leeds and Newcastle, Aberdeen, Edinburgh, and Glasgow as well as at various other county council and private colleges, while Bachelor of Science degrees in agriculture have been instituted in the chief Scottish and English universities. A large amount of instruction is also given in rural districts by itinerant lecturers and dairy instructors, as well as by field experiments and demonstrations, and the principles of agriculture are also being taught in many rural schools and evening classes.

Among agencies not directly educational in name which have, however, assisted greatly in the advancement of agriculture, a prominent position must be assigned to the agricultural associations that exist in all parts of the country in such numbers that almost every parish or group of parishes can boast of its agricultural society and its annual agricultural show. The leading associations are the Royal Agricultural Society of England, the Bath and West of England Agricultural Society, and the Highland and Agricultural Society of Scotland, which are all wealthy associations, with a large membership. The latter two societies publish an annual, and the former a quarterly journal. The Royal and the Highland Societies award diplomas in agricultural science, and also award a national diploma in dairying. They also retain the services of consulting chemists, botanists, and entomologists, who for a nominal fee give advice and information to farmers on their respective subjects. All these societies have expended large sums in carrying out manurial, feeding, dairying, and other experiments, which have been the means of adding greatly to our knowledge of agricultural science and of guiding farmers in their practice.

Among works on agriculture may be mentioned The Standard Cyclopedia of Modern Agriculture (R. P. Wright; 12 vols.); Stephens' Book of the Farm; Youatt's Complete Grazier; Coleman's Cattle, Sheep, and Pigs of Great Britain; Long's Book of the Pig; Wright's Book of Poultry; Tegetmeier's Poultry; Sutton's Permanent Pastures; Sheldon's Dairy Farming; Fleischmann's Book of the Dairy (Aikman and Wright); Scott's Farm Engineering; Storer's Agriculture in its Relation to Chemistry; Wolff's Farm Foods (Cousins); Henry's Feeds and Feeding, and Armsby's Cattle Feeding; Aikman's Manures and Manuring; Johnstone and Cameron's Agricultural Chemistry and Geology; Ormerod's Manual of Injurious Insects; Smith's Diseases of Field and Garden Crops; Ward's Diseases of Crops; Handbook of the Farm Series (13 volumes), and many others. See also articles in this work on such subjects as IRRIGATION, MANURES, PLOUGH, REAPING-MACHINES, SOWING-MACHINES, &c., and those on the different countries. In the accompanying plates the reader will find a certain number of illustrations bearing upon the subject of this article; but in such a work as the present only selected examples can be given.

AGRIGENTUM, in ancient geography, a town of Sicily represented by the modern Girgenti (which see). It was founded by a Doric colony from Gela about 582 B.C. Its situation was peculiarly strong and imposing, standing as it did on a bare and precipitous rock, 1100 feet above the level of the sea. Being favourably situated for commerce with the ports of Africa and the south of Europe, and possessing a fertile territory, Agrigentum rose to a position of great wealth and importance, and was adorned with splendid temples and public buildings. Among Sicilian towns it was second only to Syracuse. The city received a blow from which it never fully recovered in 406 B.C., when it was taken by the Carthaginians and an immense number of the inhabitants slain. After the expulsion of the Carthaginians from Sicily it fell, with little resistance, under the power of the Romans. One of the best known names connected with Agrigentum is that of the tyrant Phalaris. (See PHALARIS.) There are still many extensive ruins here, including a very perfect specimen of a Grecian temple.

AGRIMONY (*Agrimonia*), a genus of plants belonging to the natural order Rosaceæ, distinguished from the other genera of the same tribe (Roseæ) by having but two carpels inclosed in the deep tube of the calyx, from seven to twenty stamens, and small notched petals. *A. Eupatoria*, or common agrimony, is an erect, hairy, herbaceous plant found on the borders of fields and woods, by the wayside, and in similar situations. When bruised its leaves yield a pleasant, slightly aromatic, smell; they are astringent, and often form an ingredient in herb-tea, while decoctions of them are also given in fevers. The root is in some repute as a vermifuge. The stem is nearly simple, and rises almost to the height of 2 feet. The small yellow flowers in spike-like racemes give way to little bur-like fruits. Closely allied to this plant is the fragrant *A. suaveolens*, a native of Carolina, Virginia, and other parts of the United States.

AGRIPPA, CORNELIUS HENRY, born in 1486, at Cologne, was a man of talents, learning, and eccentricity. In his youth he was secretary to the Emperor Maximilian I. He subsequently served seven years in Italy, and was knighted. He says that he was acquainted with eight languages. On quitting the army he devoted himself to science, and made pretensions to an acquaintance with magic. In certain lectures he advanced opinions which involved him in contests with the monks for the remainder of his life. In 1527 he wrote a treatise De Incertitudine et Vanitate Scientiarum, which was a caustic satire upon the inefficiency of the common modes of instruction, and upon the monks, theologians, and members of the universities. At a subsequent period he produced another treatise at Antwerp, De Occulta Philosophia. This was a sketch of mystical theology, explaining, on the principles of the emanative system, the harmony of the elementary, celestial, and intellectual worlds. His pretensions to skill in occult science, particularly alchemy, led to his receiving numerous invitations from royal personages and others of high rank, and his inability to answer their absurd expectations caused their subsequent neglect of him. After an active, varied, and eventful life he died at Grenoble in 1535.

AGRIPPA, HEROD. See HEROD AGRIPPA.

AGRIPPA, MARCUS VIPSANIUS (B.C. 63–12), a Roman, the son-in-law of Augustus, with whom he was twice consul. Although not of high birth his talents soon raised him to honour; and he married

Marcella, the niece, and afterwards Julia, the daughter of the emperor. He distinguished himself as a general, and commanded the fleet of Augustus in the battle of Actium. As the minister and friend of the emperor he rendered many services to him and the Roman state. He was impartial and upright, and a friend of the arts. To him Rome is indebted for three of her principal aqueducts, the Pantheon, and several other works of public use and ornament.

AGRIPPINA, the name of several Roman ladies, among whom we may mention:—1. The youngest daughter of Marcus Vipsanius Agrippa, by Julia, daughter of Augustus; wife of C. Germanicus; a heroic woman, adorned with great virtues. She accompanied her husband in all his campaigns, and accused Tiberius before the senate of compassing his death. The tyrant, who hated her for her virtues and popularity, banished her to the island of Pandataria, where she starved herself to death, in A.D. 33, at the age of forty-six or forty-seven.—2. A daughter of the last-mentioned Agrippina, and sister of Caligula, born at Cologne, which in honour of her was afterwards called Colonia Agrippinæ. She had the misfortune to become the mother of Nero, by Domitius Ahenobarbus. Her third husband was her uncle, the Emperor Claudius, who married her after he had divorced Messalina, and whom she subsequently poisoned to secure the government of the empire through her son Nero, who was then seventeen years of age. After ruling a few years in her son's name he became tired of her ascendency, and caused her to be assassinated (A.D. 60). She was distinguished for beauty, for ability, and political experience, but her ambition was boundless, and her disposition cruel, cunning, and dissolute.

AGTELEK, a village in the Hungarian county of Gömör, near the road from Pesth to Kaschau, with about 600 inhabitants. It owes its celebrity to the stalactite grotto of Baradla (Sclavonic, 'the suffocating place') in its neighbourhood. This cavern is one of the most remarkable on the Continent; its entrance is extremely narrow (scarcely 3½ feet high by 5 feet wide), and leads into a series of intercommunicating caves and passages, which are difficult and even dangerous to explore when the streams that flow through them are full. One of the principal caves has been used for centuries as a place of refuge. The largest and most magnificent cave is called the Flower-garden; it is 96 feet high by 90 feet wide, and extends back 900 feet in a straight line. The most striking features of the cavern have received the fancifully descriptive names of the Foxes' Hole, with the Fortress, the Cathedral, a grand pile of stalactite, the Little Temple, Paradise, the Ruins of Palmyra, the Image of the Virgin, &c. Heaps of bones, both human and animal, have been found here, those of the extinct cave-bear being in the greatest abundance.

AGUA, an active volcano, adjoining those of Pacaya and Fuego, in Guatemala. It rises in a beautiful and verdant cone to the height of 15,000 feet, and occasionally pours forth stones and torrents of boiling water. It has twice destroyed the old city of Guatemala, in its immediate vicinity.

AGUAS CALIENTES, a town, 270 miles north-west of Mexico, capital of the state of its own name. It takes its name from two thermal springs, which have a temperature varying from 80° to 120°, and occupies part of an elevated but level plain (about 6000 feet above sea-level) near the point where the high-road from Zacatecas to Sonora and Durango is crossed by that from San Luis Potosi to Guadalaxara. Its churches are numerous, many of its houses handsome, and the gardens which surround it are richly stocked with various fruits. Its principal manufactures are cottons, and its annual fair lasts fourteen days. It is now a railway centre. Pop. (1900), 30,872.

AGUE, in medicine, the common name of a kind of fever, also called *intermitting fever*. It may be followed by serious consequences, but generally it is more troublesome than dangerous. According to the length of the *apyrexia*, or intermission between one febrile paroxysm and another, agues are denominated *quotidian* when they occur once in twenty-four hours, *tertian* when they come on every forty-eight hours, *quartan* when they visit the patient once in seventy-two hours. The two last are much the most obstinate, being generally attended with a greater degree of visceral obstruction than those the attacks of which return at shorter intervals. The quartan ague is apt to terminate in dropsy. An ague paroxysm has been divided into the cold, the hot, and the sweating stages. In the first or cold stage there are great languor, intense headache, violent shivering and chattering of the teeth, which cannot be checked by the influence of a fire or the heat of the sun, the tongue is pale and loaded, and the pulse is feeble, irregular, and frequent. These symptoms may continue for from half an hour to three and in some rare cases four hours, and are followed by those of the second stage, when the body gradually becomes flushed with a dry heat, the features being swollen, especially the nose and ears; the eyes are injected, and there is a splitting headache; the pulse becomes quicker, and is now full and bounding; there is intense thirst, and the urine is highly coloured and scanty. After a time varying from two to eight hours, but usually lasting three or four, the third stage makes its appearance, moisture first showing itself on the face and neck, then gradually issuing from the whole body, till there is a complete gush of sweat, which gives intense relief, lowering the standard of heat, and reducing the pulse to its usual level. The respiration becomes tranquil, and the head cool and free from pain. The patient falls into a refreshing sleep, and awakens without any remains of indisposition except a slight degree of langour and debility. Agues are always caused by malaria—that is, invisible effluvia arising from decaying vegetable and animal matter (but see MALARIA). A certain degree of heat appears necessary for the origination of malaria; ague is unknown in cold regions, and becomes more virulent the nearer the tropics are approached. It was once much more common in England and the United States than at present, when efficient systems of drainage have been extensively adopted. When the cold stage makes its appearance the application of external warmth is the best remedy; this may be done by means of bags of heated bran, salt, or other material, the vapour-bath, &c. A brisk purgative in the shape of a pill containing 1 grain of calomel and 3 grains of the compound rhubarb pill should be given. Warm diluent drinks, such as weak tea, may be freely allowed. Opium, which may be administered as laudanum, is given in the hot stage, the diluent drinks being freely allowed at the same time. The sweating stage is to be encouraged until the feverish symptoms are quite gone, wiping the skin dry and changing the linen giving great relief. To cure the disease and prevent the recurrence, quinine and various other bitter and astringent drugs are given with complete success in the majority of cases.

AGUESSEAU, HENRI FRANÇOIS D', a man distinguished in the annals of French eloquence and jurisprudence, was born at Limoges in 1668, and early evinced distinguished talents. His father, intendant of Languedoc, was his first instructor. The intercourse of D'Aguesseau with Racine and Boileau formed his taste for poetry. He was in 1690 avocat général at Paris, and at the age of thirty-two pro-

cureur général of the parliament. In this office he effected many improvements in the laws and the administration of justice, and took particular care of the government of hospitals. During a famine in the winter of 1709 he employed all his power to relieve the suffering. As a steady defender of the privileges of the nation and the Gallican Church he procured the rejection of the decrees of Louis XIV. and the Chancellor Voisin in favour of the papal bull Unigenitus. Under the government of the Duke of Orleans he was made chancellor in 1717, but fell in 1718 into disgrace, on account of his opposition to Law's destructive system of finance, and retired to his country-seat at Fresnes. He there passed, according to his own words, the happiest days of his life, employed in reading the Bible, projecting a code, and instructing his children. Mathematics, agriculture, and the arts and sciences occupied his leisure hours. In 1720 loud clamours against Law were raised throughout France, and it was thought that a man like D'Aguesseau, who possessed the love of the nation, was necessary to allay the general discontent. He was therefore replaced in his former dignity, Law himself having gone to Fresnes to entreat him to resume his office of chancellor. He set himself immediately to remedy the financial entanglements, but his measures, though they were at first successful, latterly did not meet the approbation of the parliament. In 1722 he had to retire a second time for opposing Cardinal Dubois; but was recalled in 1727 by Cardinal Fleury, and in 1737 restored to his former office. He formed the design of introducing uniformity into the execution of the ancient laws, and of adding what was wanting. But this work surpassed the ability of a single man. At the age of eighty-two he retired from office with a pension of 10,000 francs, and died the following year (1751). His works, which consist of pleadings and speeches made at the openings of the parliament, are said by Bouterwek to be models of their kind; full of spirit, judicious, elegant, yet powerful, and rich in valuable instruction for statesmen and lawyers.

AGUILAR DE LA FRONTERA, a town of Spain, in the province of Cordova, in Andalusia, occupying four low hills above the Cabra, 26 miles south by east from Cordova. It has three good squares and several handsome public buildings, and in the time of the Moors was defended by a strong castle, which still exists, but is dismantled. The chief trade is in corn and wine. Many of the inhabitants are employed in agriculture, and the breeding of mules, horses, cattle, and sheep; in manufacturing soap, cloth for local consumpt, earthenware, bricks and tiles; and in quarrying lime, gypsum, and freestone. Pop. (1887). 12.447; (1897), 13,329.

AGULHAS, Cape, a promontory, forming the most southern extremity of Africa, situated about 90 miles south-east of the Cape of Good Hope. Its highest part is 455 feet above the level of the sea. There is a lighthouse on the cape 128 feet above the sea, in lat. 34° 49′ 45″, lon. 20° 0′ 40″. The bank of Agulhas extends from the Cape of Good Hope along the south coast of Africa to Great Fish River, a distance of about 560 miles. Its breadth generally is about 100 miles, but opposite Cape Agulhas it stretches out in a triangular form to upwards of 200 miles.

AGUTI. See Agouti.

AHAB, the seventh king of Israel, succeeded his father Omri 928 B.C., and reigned twenty years. At the instigation of his wife Jezebel he erected a temple to Baal, and became a cruel persecutor of the true prophets. Though often warned, particularly by Elijah, that the divine vengeance would overtake him, he persisted in his enormities till an arrow struck him at the siege of Ramoth-Gilead, and he died the same evening.

AHASUERUS, in Scripture history, a king of Persia, the husband of Esther, to whom the Scriptures ascribe a singular deliverance of the Jews from extirpation, which they commemorate to this day by an annual feast, that of Purim, preceded by what is called the *fast of Esther*. Different opinions have been entertained as to which of the kings of Persia mentioned in other historical books may be the Ahasuerus of the Bible. He is probably the same as Xerxes.—Ahasuerus is also a Scripture name for Cambyses, the son of Cyrus (Ezra iv. 6), and for Astyages, king of the Medes (Dan. ix. 1). The word Ahasuerus is merely the Latin form of the Hebrew *Ashashverosh*, and is believed by some to be a transcription of the Persian *Khshayarsha* (venerable king), and this name may be reasonably supposed to have been originally an appellative, so that its application by foreigners, like the Jews, to different royal personages is explained.

AHAZ, the twelfth king of Judah, succeeded his father Jotham, 742 B.C. Forsaking the true religion, he gave himself up so completely to idolatry that he is said to have caused his own son to pass through the fire to Moloch, and plundered the temple to obtain presents for Tiglath-pileser, king of Assyria, whose assistance he desired to obtain. His powerful ally freed him from his most formidable foes by invading Syria, taking Damascus, killing Rezin, the king, transporting the inhabitants to Kir, thus putting an end to the Syrian kingdom of Damascus, and by stripping Israel of the whole country east of the Jordan. Yet it seems that the intervention of the King of Assyria was no great gain to Ahaz, for Tiglath-pileser, in the words of the narrative, distressed him, but strengthened him not. After a reign of sixteen years Ahaz died and was buried in Jerusalem, but not among the sepulchres of the kings.

AHMEDABAD, or Ahmadábád, a town of India, in the presidency of Bombay, capital of the district of its own name, on the left bank of the Sabermutty (Sábarmatí), 270 miles north of Bombay. It was founded in 1412 by Ahmed Shah and was converted by him into a great capital, adorned with splendid edifices, among which is the Jama Masjid, or Great Mosque, which stands in the middle of the city. It has two lofty, well-proportioned minarets, highly decorated, and with flights of steps and a gallery at the top. Other noteworthy buildings are the Jain temple of Seth Hathisinh, a recent edifice in the finest style of Jain architecture; the elegant mosque of Sujaat Khan; and the Ivory Mosque, built of white marble, lined with ivory, and inlaid with gems to imitate natural flowers. Under the Moguls Ahmedabad lost none of its splendour, and is described by Ferishta, in the beginning of the seventeenth century, as having streets 'sufficiently wide to admit of ten carriages abreast,' and as 'on the whole the handsomest city in Hindustan, and perhaps in the world.' In its present decayed state it is a large and populous place, inclosed by a strong and lofty wall, flanked with numerous towers, and entered by a dozen gates. The manufactures, for which it was long celebrated, consisted chiefly of fine silk and cotton fabrics, cloths of gold and silver, various other articles of the precious metals, and of steel, enamel, mother-of-pearl, &c. In 1780 the city was stormed and taken from the Mahrattas by the British under General Goddard, but was soon afterwards restored to its former possessors, who held it till it came finally into the hands of the English in 1818. A portion of its former activity and prosperity has returned to it. Its silk manufactures are large, and there are many cotton-mills, besides other works. Pop. (1901), 185,889.

AHMEDNUGGUR, or AHMADNAGAR, a town of India, in the presidency of Bombay, capital of a district of its own name, a station on the Great Indian Peninsular Railway. It is surrounded with an earthen wall of no great height, and most of the houses are built of sun-burnt bricks. Some of the old mosques are now converted into government offices or dwellings for Europeans. There is here an American mission and church. There is a stone fort near the city. Ahmednuggur was founded by Ahmed Nizam Shah in 1494, and, after passing through various hands, was betrayed to the Peishwa in 1759. In 1803 the Duke of Wellington, then General Wellesley, compelled its surrender after a siege of only two days. Having returned to the Peishwa, it passed with his other possessions under British rule in 1817. Cotton cloths, silks, carpets, &c., are manufactured. Pop. (1901), 42,032.

AHRIMAN, or ARIMANES (in the Zend *Angromaïnyus*, spirit of evil or annihilation), is, according to the dualistic doctrine of Zoroaster, the origin or the personification of evil; from him proceed all the destructive powers of nature, poisonous plants, savage beasts, &c.; he is sovereign of the Devas or evil spirits, lord of darkness and of death, being thus opposed to Ormuzd (*Ahuramazda*), the spirit of good and of light. Both were visible manifestations of the *Zervan-Akerene* (Infinite Time), both existed from all eternity, according to the Magians, although Zoroaster seems to have taught that Ahriman was created. Ahriman has not creative power, and can only implant the seeds of evil into what has been already created by Ormuzd. The two opposing spirits are engaged in a fierce conflict which is to last 12,000 years, at the end of which time Ahriman will be completely vanquished. See ZOROASTER.

AID, a subsidy paid, in ancient feudal times, by vassals to their lords on certain occasions, the chief of which were: when their lord was taken prisoner and required to be ransomed; when his eldest son was to be made a knight; and when his eldest daughter was to be married and required a dowry. The right of levying aids was abolished by 12 Car. II. cap. xxiv.

AIDAN (or ÆDAN), SAINT, Abbot or Bishop of Lindisfarne, was originally a monk of Iona, in which monastery Oswald I., who became king of Northumberland in 635, had been educated. At the request of Oswald, Aidan was sent to preach Christianity to his subjects, and is said to have been eminently successful. He established himself in Lindisfarne, hence in after times called Holy Island, where he induced Oswald to found a monastery, over which he presided as abbot. He is reckoned the first of the line of bishops now designated of Durham, in which city the episcopal residence was fixed at the end of the tenth century. He died in 651, probably on the 31st of August, as that is the day assigned to him in the Roman calendar.

AIDE-DE-CAMP, a military officer who conveys the orders of a general to the various divisions of the army on the field of battle, and at other times acts as his secretary and general confidential agent. In the field all orders, whether verbal or written, communicated by the aide-de-camp must be as implicitly obeyed as if they were given by the general himself in presence of those he wishes to act. Aides-de-camp are most commonly captains, and before they receive their appointment have to pass an examination; each aide receives 9*s.* 6*d.* a day in addition to his regimental pay. The appointment is in the hands of the general officers. A general-in chief is entitled to four aides-de-camp, a general to three, a lieutenant-general to two, a major-general to one, and a brigadier-general to one. Extra aides-de-camp may be allowed if absolutely necessary, or in time of war. There are also a number of special aides-de-camp, both military and naval, belonging to the king and appointed by him, to the number of whom there is no restriction. In the case of the king's military aides-de-camp, the holder of the office enjoys the rank of a colonel in the army; but with the exception of a limited number, who take in turns the duty of attending his majesty on state occasions and receive daily pay (10*s.* 5*d.*), the post is merely an honorary one.

AIDIN, or GUZEL HISSAR (the ancient *Tralles*), a town in Asiatic Turkey, in the vilayet of Smyrna, on the Meander, about 60 miles south-east of Smyrna, with which it is connected by rail. Part of the remains of the ancient city are seen on a height overlooking the modern town, which is the residence of a pasha, and has an extensive trade in cotton, leather, figs, grapes, and other fruits. Its mosques, churches, and synagogues are numerous and often handsome, and its bazaars form whole streets, shaded by trees. One of its most conspicuous objects is an ancient palace, the ruins of which, finely situated on a height, are seen at a distance of many miles. The population is about 40,000.

AIGRETTE (French), a term used to denote the feathery crown attached to the seeds of various plants, such as the thistle, dandelion, &c. (called in botany *pappus*); it is also applied to the lesser white heron, called in English egret, a bird of the genus *Ardea*, with an elegant form and a feathery crest. The word has been further applied to the heron's crest itself and to any head-dress in the form of a plume, whether composed of feathers, flowers, or precious stones.

AIGUES MORTES (*Aquæ Mortuæ*), a small town of France, near the mouths of the Rhone, in the department of Gard, 20 miles S.S.W. of Nismes. The place claims to have been founded by the Roman Marius. It was greatly extended by St. Louis, who constructed here a good port, from which he embarked for the Crusades. The canal connecting it with the sea is being rapidly filled up with detritus from the Rhone. In the principal square of the town is a fine statue of St. Louis by Pradier. In the vicinity are lagoons, from which great quantities of salt are made. The exhalations from these and the salt marshes make the place very unhealthy. Pop. 4000.

AIKIN, JOHN, M.D., an English miscellaneous writer, born at Kibworth-Harcourt in Leicestershire, 1747; died at his residence in Stoke-Newington, 1822. He practised as physician at Chester and Warrington, and after taking his degree of M.D. at Leyden, attempted to establish himself as a physician in London. Meeting with but little success in that capacity, he turned his attention to literature and published various works of a miscellaneous description, some in conjunction with his sister Mrs. Barbauld. The six volumes entitled Evenings at Home (1792–95), the joint production of brother and sister, were written with the view of popularizing scientific inquiries, and were received with great favour at home and in translations equally so abroad. His most elaborate work is his General Biographical Dictionary, begun in 1799 and finished in 1815. He was editor of the Monthly Magazine from 1796 till 1806, in which capacity he distinguished himself as a very sensible and entertaining essayist.

AIKIN, LUCY, daughter of the preceding, was born at Warrington in 1781. To her father she was indebted for a good sound English and classical education, and her first essays in literature were made early in life as assistant to him in some of his later works and as a magazine writer. In 1810 she published her Poetical Epistles on Women, which were well received. This was followed by a number of books for the young. In 1818 appeared her Memoirs

of the Court of Queen Elizabeth, one of the first and one of the best of the historical monographs in which English authoresses have shown so much industry. It became immediately popular, and has since gone through several editions. She afterwards produced similar works on the reigns of James I. (1822) and Charles I. (1833), and a life of Addison (1843). In 1824 she had published the literary remains and biography of her father, under the title Memoirs of John Aikin, M.D., with a Selection of his Miscellaneous Pieces, Biographical, Moral, and Critical. Though she seldom quitted her quiet residence at Hampstead, where she lived forty years, yet she was well acquainted with almost all her distinguished literary contemporaries, and had a keen relish and rare talents for social intercourse. She carried on an interesting correspondence with Dr. W. E. Channing for above sixteen years. She died at Hampstead 29th January, 1864. In that year appeared the Memoirs, Miscellanies, and Letters of Lucy Aikin, by P. H. Le Breton, the letters being chiefly those addressed to Dr. Channing.

AIKMAN, William, an eminent portrait-painter, was born at Cairney (near Arbroath), Forfarshire, of which county his father was sheriff, 24th October, 1682. He studied art at Edinburgh, then for three years in Italy, and afterwards visited Turkey. The latter portion of his life (from 1723) was spent in London. He enjoyed the friendship of most of the wits of Queen Anne's time, especially Swift, Pope, Gay, Somerville, and his countrymen, the celebrated Dr. Arbuthnot and the poet Thomson. His best portraits are those of the poet Gay, the Buckinghamshire family, and an unfinished painting of the royal family. His compositions are distinguished by a placid tranquillity rather than a striking brilliancy of effect, and his portraits may be more readily mistaken for those of Sir Godfrey Kneller than the works of any other eminent artist. He died 7th June, 1731.

AILANTO, Ailanthus (*Ailantus*), a genus of trees belonging to the nat. order Simarubaceæ. The *Ailantus glandulosa* is a native of China, but has been introduced into Europe and North America. It is a large and handsome tree with pinnate leaves one or two feet long. In the south of Europe and in the United States the streets and public walks are often planted with the ailanto, and it is not uncommon in England and Scotland. It grows very fast, especially in calcareous soil. The wood is hard, heavy, glossy, and susceptible of a fine polish. A species of silk-worm, the ailanthus silk-worm (*Saturnia cynthia*), feeds on its leaves, and the silk produced, though wanting the fineness and gloss of ordinary silk, is less costly and more durable.

AILRED, Alured, or Ealred (a contracted form of Ethelred), a religious and historical writer, believed to have been born in 1109 at Hexham. He was educated in Scotland along with Henry, son of David I., king of the Scots. He afterwards came into England and embraced a religious life in the celebrated abbey of Rievaulx, in the North Riding of Yorkshire, then a newly-founded house, of which he became the third abbot. Before this he had been abbot of the Cistercian monastery of Revesby, in Lincolnshire. A volume of his religious writings, including sermons on Isaiah, a treatise entitled the Mirror of Charity, and other devotional tracts, was published at Douay in 1631. His principal historical works were first published by Sir Roger Twysden in his collection of early English chroniclers, printed in 1652. Their subjects are—the War of the Standard in the Time of King Stephen, Genealogy of the Kings of England, the Story of the Nun of Watten, and Life and Miracles of Edward the Confessor. As a historian Ailred too generally prefers improbable legends to solid truth; but his works are of some value, as they give us occasional glimpses of the life and manners of the time. Ailred died in 1166, and was buried in the church of his monastery, a great part of the walls of which still remains.

AILSA CRAIG, a rocky island in the Firth of Clyde, between the coasts of Ayr and Cantyre peninsula. It forms a conspicuous object, about 1100 feet high, 10 miles from Ayrshire, about 2 miles in circumference; lon. 5° 7′ w., lat. 55° 15′ 12″ n. It is of a conoidal form, with an irregular elliptic base 3300 feet in the major axis by 2200 in the minor, and consists of columnar trap approaching in some parts to basalt. It is precipitous on all sides except the north-east, on which it slopes towards the shore, and where alone it is accessible. Innumerable seafowl, many of which (including solan-geese) are good for the table or valuable on account of their feathers, frequent it; many rabbits and a few goats live on its surface, which in some parts is covered with luxuriant herbage. There are two copious springs near the summit. A lighthouse has been constructed on the east side. There are also two fog-horns. Excellent banks, well stocked with fish, surround the island. It is the property of the Marquis of Ailsa (Earl of Cassilis in the Scottish peerage), who takes his title from it as a British peer.

AIN, a frontier department of France, in the ancient province of Burgundy, divided into two nearly equal parts by the river Ain. Its length from east to west is about 52 miles, its greatest breadth 48 miles; area, 2239 square miles. Its eastern portion is covered by a prolongation of the Jura, and is more pastoral than agricultural; its western portion is somewhat marshy, but has a considerable extent of cultivated ground. The chief products are rye, maize, wheat, and fruits of various kinds. The vines yield a good *vin ordinaire*, which is largely exported. Great numbers of sheep, horses, and cattle are reared. The manufactures consist chiefly of cloth, linen, paper, straw-hats, and watches. The chief mineral products are coal, iron, asphalt, excellent building stone, gypsum, and lithographic stones. One remarkable feature in the department is the number of its lakes, which exceed 1600, though not one of them is above 2 miles long. Ain is divided into five arrondissements, thirty-six cantons, and 453 communes. Capital, Bourg. Pop. (1886), 364,408; (1896), 351,569 (1906), 345,856.

AINMILLER, Max Emanuel, a famous German artist, to whom we may be said to owe the restoration of the art of glass-painting, was born at Munich 14th February, 1807. Under the superintendence of Fr. von Gärtner, director of the Royal Porcelain Manufactory, he devoted himself to the study of architecture and decoration, which he abandoned in 1828 on the establishment of a state institute for the art of glass-painting, of which he was made inspector, and which he raised to a high degree of perfection. He is said to have been the first to whom the lucky idea occurred of laying coloured glass on coloured, instead of the method formerly adopted of laying coloured glass on white—thus gaining command of selection from over 100 variously-coloured glasses in every gradation of shade. He was also instrumental in reviving the art of miniature glass-painting, a branch, however, which never received his serious attention. He executed many important pictures in glass for edifices on the Continent of Europe as well as in Britain. Among these are forty windows containing 100 historical and scriptural pictures in Glasgow Cathedral. He produced similar examples for the University Church, Cambridge, one of the minor windows of St.

Paul's, London, and others for the Duke of Northumberland. On the Continent his productions are to be found in the cathedrals of Ratisbon, Cologne, Augsburg, and elsewhere. Ainmiller also enjoyed a high reputation as an architectural painter in oil. He died at Munich, 8th December, 1870.

AINOS, or AINUS, the native name of a race of people inhabiting the Japanese island of Yesso, Saghalien, and the Kurile Islands, supposed to have been the aboriginal inhabitants of Japan. They do not average much over 5 feet in height, but they are remarkably strong and courageous. They live in communities of from eight to twenty families under a chief. They have beards 5 or 6 inches in length, and long black hair, and the whole of their body is remarkable for hairiness. Their complexion is of an olive tint, or darker. Their language is mellifluous, and differs widely from that of the Japanese, who communicate with them in a sort of mongrel dialect. Their religious notions are very crude, and they are represented as being socially and intellectually in a low condition, though possessing many good qualities, of which cleanliness is not one. They have no idea of computation, and refer dates to particular events, such as the capture of a whale or the advent of an extraordinary shoal of fish. They support themselves chiefly by hunting and fishing, and live in huts of earth in winter and in straw huts in summer. The Ainos have been studied in recent years by various travellers, as Miss Bird, and Mr. Landor. Their numbers have been estimated at from 15,000 to 20,000, and are said to be decreasing.

AINSWORTH, HENRY, a famous Nonconformist divine and scholar, was born in 1571 near Blackburn, Lancashire. He is said to have been a son of Lawrence Ainsworth of Pleasington Hall, and to have been in his youth a member of the Church of England. About 1590, however, he seems to have joined that section of the Nonconformists known as the Brownists, and three years later he was driven from England by religious persecution. About 1593 he turns up as a resident in a blind alley in Amsterdam, occupied as porter to a learned publisher of that city, who, on discovering Ainsworth's acquaintance with Hebrew, introduced him to his countrymen. On the foundation of the Brownist church in Amsterdam Francis Johnson was elected the pastor and Ainsworth doctor or teacher in 1596. Controversy and at last violent strife broke out among the sect, into which he was reluctantly drawn, one of his most zealous opponents being his friend Johnson. Two congregations were formed, of one of which Ainsworth was pastor from 1610 till his death in 1622 or 1623. Neal tells the following improbable story about his death:—He one day found a valuable diamond, which he restored to its owner, a Jew, merely asking as compensation a conference with some rabbis on the prophecies of the Old Testament concerning the Messiah. This the Jew promised to bring about, but finding his influence did not reach so far he poisoned Ainsworth through shame and vexation. Among the best of his controversial treatises are, A Defence of the Holy Scriptures, Worship, and Ministry against the Challenges, Cavils, and Contradictions of M. Smyth (1609); An Arrow against Idolatry taken out of the Quiver of the Lord of Hosts (1611). He is, however, much better known as a thorough Hebrew scholar than as a polemical writer by his Annotations on the First Five Books of Moses (1616–19), the Psalms (1612), Song of Solomon (1623), which are not without value even at the present day.

AINSWORTH, ROBERT, Latin lexicographer, was born at Woodyale in Eccles parish, Lancashire, 1660, and became master of a boarding-school at Bethnal Green, whence he removed to Hackney and other places in the neighbourhood of London. After acquiring a moderate fortune he lived privately till 1743, when he died. He compiled the well-known Latin and English Dictionary, commenced in 1714 and published in 1736. In 1752 the fourth edition, under the care of Dr. Ward and William Younge, was enlarged to two vols. folio. Many editions with improvements have followed, but it is now entirely superseded by later works, which embody the results of modern philological research.

AIN-TAB, an ancient frontier and garrison town of Syria, capital of a district of the same name, 55 miles north of Aleppo. It is tolerably well built, the houses being principally of stone, and contains five fine mosques, several baths, an Armenian church, and good bazaars. There is an extensive trade in leather and hides, and cotton of coarse quality is grown in the vicinity. Its citadel or castle stands in an elevated position, and has a very striking appearance. Aintab is the station of an American Protestant mission. Pop. about 30,000.

AIR, a mixture of 79·19 per cent by measure of nitrogen and 20·81 per cent of oxygen. (See NITROGEN, OXYGEN.) The two gases oxygen and nitrogen, in the above proportions, principally form the atmosphere of the earth. (See ATMOSPHERE.) The purpose chiefly served by the nitrogen appears to be to dilute the oxygen which is constantly entering into combination with other elements or being set free from compounds, and thus keeping up the general activity of nature. Broadly we may describe the animal world as consuming oxygen, and the vegetable world as giving back oxygen to supply the place of that consumed by animals. It must, however, be borne in mind that this will not serve to distinguish the animal from the vegetable world, for when a seed is germinating, and at other times, plant-life consumes oxygen. If we burn a piece of coal we know how many units of heat it will give out, we know how much energy has been concerned, we know how much work, by means of steam machinery say, this mutation of energy will accomplish, we know how much carbonic acid (carbonic anhydride) has been added to the atmosphere, and we know how much oxygen has entered into combination with carbon to form the carbonic acid. Such a mutation of energy has been available to do work, and the bringing of matters back to their unburned condition will involve at least as much energy mutating in the inverse direction. Carbonic acid will no more split up of its own accord into oxygen and carbon than water will naturally flow up a hill. Water does ascend to the tops of hills when the heat of the sun converts it into vapour; and carbonic acid also splits up into carbon and oxygen in contact with vegetable life acted on chemically by sunlight. Oxygen is more soluble in water than nitrogen, and hence the air dissolved in water contains about 10 per cent more oxygen than atmospheric air. The oxygen therefore available for those animals which breathe by means of gills is somewhat less diluted with nitrogen, but it is very much diluted with water. Like other gases and gaseous compounds which require an enormous pressure to liquefy them, air follows Boyle's or Mariotte's law for a very great range of pressure. See GAS; and for the various properties and phenomena connected with air consult also such articles as AËRONAUTICS, AIR-PUMP, BAROMETER, COMBUSTION, LIQUID AIR, RESPIRATION, &c.

AIR, in music (in Italian, *aria*), at the present day means a continuous melody, in which some lyric subject or passion is expressed. The lyric melody of a single voice, accompanied by instruments, is its proper form of composition. Thus we find it in the higher order of musical works; as in cantatas, orato-

rios, operas, and also independently in concertos. It should be constituted of euphonic simple lyric strains. Many of the Italian airs of the present day, together with too great a proportion of the popular music of this country, although characterized by melodic sweetness, are destitute of meaning and character, an objection which attests a lack of inspiration in the composers, or an indifference or distaste in the public for true vocal music. The song-writers of Germany, however, still strive, and strive successfully, to construct their airs in direct conformity to the meaning of the words.—AIR is also the name often given to the upper or most prominent part in a concerted piece, and is thus equivalent to *treble, soprano*, &c.—*Arietta* signifies a short, less elaborate air than *aria*, and is designed to express a more simple and transient emotion.

AÏR, or ASBEN. See ASBEN.

AIRA. See HAIR-GRASS.

AIR BEDS AND CUSHIONS are composed of a cloth made air-tight by a solution of india-rubber, and when required for use filled with air, which thus supplies the place of the usual stuffing materials. The apparent advantage consists in the comparative cheapness and the facility of transport, as the bed or cushion, when not in use, can be wrapped up in small compass, to be again filled when wanted by an opening at one of its extremities made air-tight by a screw; the disadvantage is the excessive heat, the air, once heated by the body, being too bad a conductor of heat readily to part with it, and producing a very unpleasant sensation. The use of air in this way has, accordingly, been in a great measure abandoned.

AIR-BLADDER OF FISHES. See SWIMMING BLADDER.

AIR-CELLS, cavities in the cellular tissue of the stems and leaves of plants which contain air only, the juices of the plants being contained in separate vessels. They are largest and most numerous in aquatic plants, as in the *Vallisneria spiralis* and the *Victoria regia*, the gigantic leaves of which latter are buoyed up on the surface of the water by their means. There are also air-cells in the bodies of birds. They are connected with the respiratory system, and are situated in the cavity of the thorax and abdomen, and sometimes extend into the bones. They are most fully developed in birds of powerful and rapid flight, such as the albatross.

AIRDRIE, a municipal and parliamentary burgh, Scotland, in Lanarkshire, 11 miles east of Glasgow. It stands in the centre of what has hitherto been considered the richest mining district of Scotland, and to this owes its prosperity. It has regular, well-paved, and well-lighted streets, and contains some handsome buildings, such as the town-hall, the county-buildings, the offices of several branch banks, a public hall, and several of the churches. There are a mechanics' institute and library, an academy, &c. It depends chiefly on the collieries and ironworks in its vicinity, but has also a large cotton-mill and factory, several extensive foundries and machine-shops, tube-works, &c. It unites with Hamilton, Falkirk, Lanark, and Linlithgow in sending a member to Parliament. Pop. in 1881, 13,363; in 1901, 22,288.

AIR-ENGINE. See SUPPLEMENT.

AIRE-SUR-LA-LYS, a town of France, in the department of Pas de Calais, 10 miles south-east of St. Omer. It stands at the junction of the Lys with the Laquette, on a low marshy site, but is well built, and possesses several beautiful fountains, a handsome Gothic church, and barracks for 6000 men. Its trade is chiefly in linens, fustians, hats, thread, starch, soap, Dutch tiles, osier work, and grain. Pop. (1891), 5165; (1901), 5366.

AIR-GUN, an instrument for the projection of bullets by means of condensed air. The ancients were acquainted with the principles of its construction, and an instrument of this description was invented by Ctesibius of Alexandria, who flourished about 120 B.C. The first modern account of an air-gun which we meet with is in the Éléments d'Artillerie of David Rivaut, preceptor to Louis XIII. of France. Air-guns are generally either in the form of an ordinary gun, or of a pretty stout walking-stick, and about the same length. They consist essentially of an air-chamber, a lock, and a barrel. A quantity of air is compressed into the air-chamber by means of a condensing syringe, which may or may not be attached to the weapon. The bullet is placed immediately in front of the air-chamber, and is propelled by the expansive force of a certain quantity of the compressed air, which is liberated on pressing the trigger.

AIR-PLANTS, so called from their power of living for a considerable time suspended in the air apparently without receiving any nutriment, belong to the two very different tribes of the Bromeliaceæ and Orchidaceæ. The conditions necessary to their growth are excessive heat and moisture, and hence their chief localities are the damp and shady tropical forests of Africa, Asia, and America. They are particularly abundant in Java, where nearly 300 species have been counted, and their beautiful and fragrant festoons hanging from the branches of the trees form one of the most interesting features in the woods of tropical America. One of the species (*Tillandsia xiphioides*) is a common ornament of the balconies in the streets of Buenos Ayres. They are generally found in places where their roots are in contact with at least minute quantities of vegetable matter, and even with the juices of the plants on which they grow, so it is probable they are partly nourished much in the same way as other plants. Deliciously scented specimens of beautiful orchids have been successfully cultivated in hothouses in this country.

AIR-PUMP, a machine by means of which air or other gas may be removed from an inclosed space; or a machine for compressing air within an inclosed space. An ordinary suction-pump for water is a rough kind of air-pump; indeed, before water reaches the top of the pipe the air has been pumped out by the same machinery which pumps the water. An ordinary suction-pump consists essentially of a cylinder or barrel, having a valve opening from the pipe through which water is to rise and a valve opening into the outlet pipe, and a piston fitted to work in the cylinder (the outlet valve may be in the piston). (See PUMP.) The arrangement of parts in an air-pump is quite similar. The barrel of an air-pump fills with the air which expands from the receiver (that is the vessel from which the air is being pumped), and consequently the quantity of air expelled at each stroke is less as the exhaustion proceeds. Suppose that the receiver or vessel to be exhausted is exactly as large as the barrel; by the first stroke there is just half the air removed, by the second there is one-fourth, by the third there is an eighth, and so on. Suppose the barrel is $\frac{1}{3}$ of the receiver as to volume. On raising the piston the air which filled the receiver now fills both barrel and receiver, so that $\frac{1}{4}$ is removed at the first stroke, $\frac{1}{4}$ of the remaining $\frac{3}{4}$ is removed at the second stroke—that is, $\frac{3}{16}$, and $\frac{1}{4}$ of $\frac{9}{16}$ at the third stroke; the quantity removed at each stroke forming a series of $\frac{1}{4}$, $\frac{3}{16}$, $\frac{9}{64}$, $\frac{27}{256}$, &c.; that is, the total quantity removed is $\frac{1}{4}\left(1 + \frac{3}{4} + \left(\frac{3}{4}\right)^2 + \left(\frac{3}{4}\right)^3 + \text{&c.}\right)$ At each stroke we add a term to this series, and consequently the quantity removed by each stroke becomes smaller and smaller. Fig. 1 represents the essential parts of a good air-pump. E is the receiver,

F is a mercurial pressure-gauge, which indicates the extent of exhaustion; it is a three-way cock, by means of which air may be readmitted to the receiver, or by means of which the receiver may be shut off from the pump-barrel. S′ is the inlet valve of the

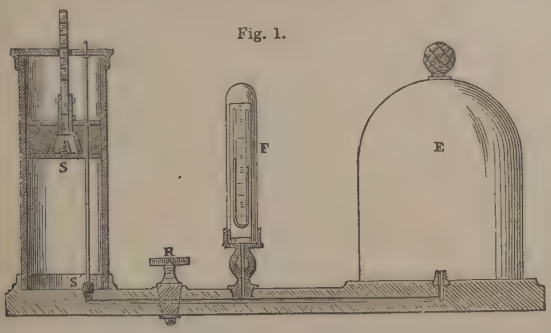


Fig. 1.

barrel; and, inasmuch as the tension of the air in the receiver after some strokes would not be sufficient to lift a valve, this valve is opened by means of the rod which passes up through the piston, and works in it tightly so as to be carried up and down by the motion of the piston; a catch at the upper part of the rod confining its motion within very narrow limits, and only permitting the stopper to rise a small distance. The outlet valve S is kept down by a light helical spring; it opens when, on the space diminishing in the barrel by the descent of the piston, the contained air has a sufficient pressure. The pressure-gauge is merely a siphon barometer inclosed in a bell-shaped vessel of glass and communicating with the receiver. This barometer consists of a bent tube, the branches of which are about a foot in length, one of them being closed and filled with mercury,

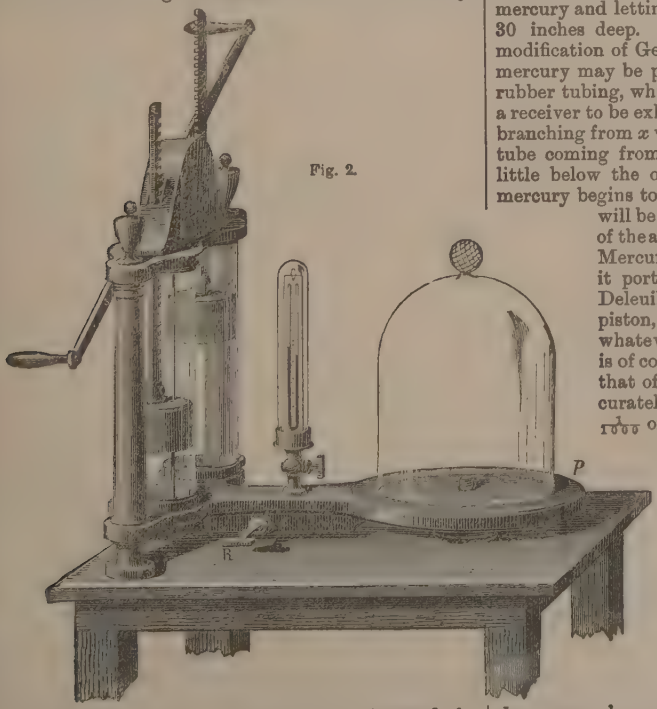


Fig. 2.

the other being open. As the air is exhausted the smaller is the difference between the height of the mercury in the two branches of the tube, and a complete vacuum would be indicated if the mercury stood at the same level in both branches. It will be observed how important it is that there should be very little air-space below the piston in the barrel when the piston is completely down. Fig. 2 represents a double-cylinder air-pump. The cylinders are of glass. Two racks carrying the two pistons work with a pinion to which a double-handed lever is attached, the lever being moved alternately in opposite directions. In this arrangement when one piston ascends the other descends, and consequently in each single stroke the air of the receiver passes into one or other pump-barrel. A vacuum is thus produced by half the number of strokes which would be required with a single-barrel pump. The two passages from the barrels unite in a single passage to the centre of the plate P. Bianchi's air-pump is a double-action air-pump—that is, the arrangement is such that the cylinder exhausts above the piston as well as below it. This pump is arranged to have an appearance resembling an oscillating steam-engine, and is worked by a handle attached to a spoke of the fly-wheel. Kravogl's air-pump is a double-cylinder air-pump, which exhausts at the upper side of the piston. The pistons are worked from below, and the upper face of the piston carries a quantity of mercury, so that when the piston is driven to the end of its stroke this mercury completely fills all the space. This air-pump has no untraversed space, and the evaporation of the oil or grease of the piston-packing, &c., which in ordinary pumps interferes with the perfectness of the vacuum, does not take place. Geissler's air-pump essentially consists of an apparatus which produces a vacuum by repeatedly filling the cylinder of an air-pump with mercury and letting it run out below through a tube 30 inches deep. Sprengel's air-pump (fig. 3) is a modification of Geissler's. A is a funnel into which mercury may be poured, C is a connection of india-rubber tubing, which may be clamped as shown. R is a receiver to be exhausted; it is connected to the tube branching from x with india-rubber tubing; the glass tube coming from A to B has its lower extremity a little below the opening from B, so that when the mercury begins to flow out of B the end of the tube will be covered with mercury. The length of the apparatus from A to B should be 6 feet. Mercury falling from A to B carries with it portions of air which expand from R. Deleuil's air-pump is an air-pump with free piston, that is, the piston has no packing whatever. The piston is made of metal, and is of considerable length, about three times that of its diameter; it is turned very accurately to fit the cylinder, so as to have $\frac{1}{1000}$ of an inch of freedom, and grooves are turned on its edge. It is found that the thin adhesive film of air on the edge of this piston is sufficient packing to permit the pump to give as good a vacuum as is obtainable by ordinary pumps. Like Bianchi's pump it is single-barrelled with double action.

There are also air-pumps for compressing air—the reverse operation from exhausting air—and a compressing pump may be considered as one of the cylinder pumps above-described, but having the receiver connected with the escape-valve. There is not so

much nicety required in compressing pumps as with exhausting pumps. It may be observed that at the commencement of the stroke the effective pressure against the piston is, we may say, 0, and when it has got to that position where the valve opens towards the receiver the effective pressure is that of the air in the receiver. It will be seen that when the pressure in the receiver is considerable the variation of pressure during the stroke is very great. It is on this account that compression-pumps are sometimes used in which a set of cylinders have their pistons worked by a number of cranks differently set on the same shaft, which shaft also carries a fly-wheel. There is some difficulty in compressing air considerably, from the heating of the pistons and cylinders, when the operation is rapidly proceeded with. Air may be compressed by sending water at pressure into an air-tight chamber containing air.

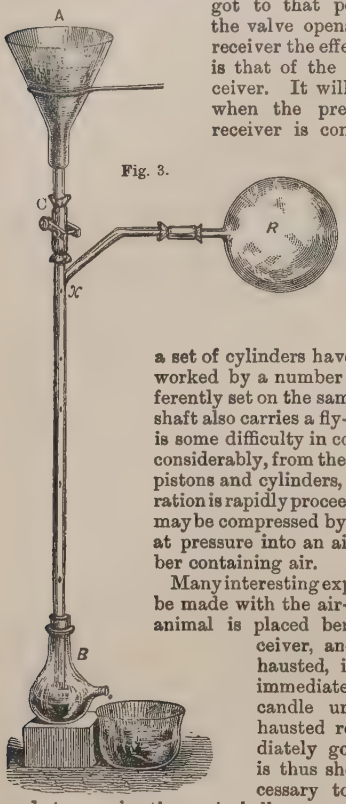


Fig. 3.

Many interesting experiments may be made with the air-pump. If an animal is placed beneath the receiver, and the air exhausted, it dies almost immediately; a lighted candle under the exhausted receiver immediately goes out. Air is thus shown to be necessary to animal life and to combustion. A bell, suspended from a silken thread beneath the exhausted receiver, on being struck cannot be heard. If the bell be in one receiver from which the air is not exhausted, but which is within an exhausted receiver, it still cannot be heard. Air is therefore necessary to the production and to the propagation of sound. A shrivelled apple or cranberry placed beneath an exhausted receiver becomes as plump as if quite fresh. They are thus shown to be full of elastic air. The air-pump was invented by Otto von Guericke, burgomaster of Magdeburg, about the year 1654.

AISLE (from Latin *ala*, a wing), in architecture, a term generally applied to the lateral divisions of a church, which are separated from the central portion or nave, or from the choir by piers or pillars. In Great Britain there is only one aisle on each side of the nave, but the continental buildings have often two. The cathedrals at Antwerp and Paris have seven aisles in all, but these are fairly eclipsed by the cathedral of Cordova, which was first built with a nave and five aisles on each side, to which eight more were added, making nineteen in all. The nave is sometimes called the central aisle.

AISNE, a department of France, bounded north by Belgium and the department of the Nord; east by Ardennes and Marne; west by Seine-et-Marne, Oise, and Somme; the southern boundary is formed by the departments of Marne and Seine-et-Marne, which meet at a point; area, 2838 square miles. The department is watered by the Somme, Escaut, Sambre, and Oise in the north; by the Aisne in the centre; and the Marne in the south. The surface consists of undulating plains and low hills; the soil is mostly calcareous, in the north clayey or slaty. The elevated table-land is the most fertile. The natural products are numerous, including a variety of cereals, beet-root, and wine of inferior quality. There are considerable forests. The minerals, except building-stone and slate, are not important. The manufactures, which are extensive, consist of cotton, linen, and woollen fabrics, glass, ironware, &c. The department is divided into five arrondissements, St. Quentin, Vervins, Laon, Soissons, and Château Thierry. The town of Laon is the capital. Pop. (1891), 545,493; (1896), 541,613; (1901), 535,583.

AIVALI, or KIDONIA (the ancient *Heracleia*), a town of Asiatic Turkey, on the promontory forming the west side of the Gulf of Adramyti, 66 miles north by west of Smyrna. In the beginning of the nineteenth century it was a place of considerable note, but in June, 1821, during a contest between the Greeks and Turks, it was set on fire by the latter and reduced to ashes. It has again revived, however, and now possesses a population of 30,000. The olive is extensively cultivated in the district, and much oil and soap manufactured. Cotton also is grown, and ship-building carried on. There are nearly 100 oil-mills, and twenty soap-manufactories.

AIX (among the Romans, *Aquæ Sextiæ*), a town of southern France, in the department of Bouches-du-Rhône, on the river Arc. It is the seat of an archbishop and of one of the provincial universities, and possesses a high court of appeal and chamber of commerce, a school of theology and jurisprudence, library, and a museum. Most of the modern streets are broad and well-paved, but the older ones are narrow and dirty. The houses are in general well-built, and the public buildings handsome. There are numerous public fountains, one of which has a statue by David of 'Good King René'. There is an old and curious clock-tower with certain antique figures which are set in motion when the clock strikes. Among the chief ornaments of Aix are the baptistery, constructed with the remains of a Roman temple. Several manufactures are carried on in the city, principally of cotton, silk, and velvet stuffs, also of oil, soap, hats, flour, &c. The warm baths are less visited than formerly. They are said to improve the appearance of the skin. Aix derives its principal support from the culture and manufacture of silk in its extensive district, as well as from the cultivation of the olive and other fruits. It is said to have been founded in 120 B.C. by the Roman consul Caius Sextius on account of its mineral springs, and hence was called Aquæ Sextiæ ('the waters of Sextius'). Between this town and Arles (Arelate) Marius gained his great victory over the Teutons, 102 B.C. Pop. (1906), 24,378.

AIX, or AIX-LES-BAINS, a town of France, in the department of Savoie, 8 miles north of Chambéry, near the Lake Bourget, in a fertile valley, through which a long avenue of poplars leads to the lake. Aix is celebrated for its hot aluminous and sulphurous springs, which annually attract a number of strangers. The waters were in repute with the ancients, by whom they were called *Aquæ Gratianæ*, because the proconsul Domitius repaired them in the reign of the Emperor Gratian. There still remain some ruins of a triumphal arch, and of a temple of Diana. Pop. (1901), 5437.

AIX-LA-CHAPELLE (German, *Aachen*; Latin, *Civitas Aquensis*, *Aquisgranum*), capital of a district of the same name in the Prussian province of the Rhine, about 38 miles west by south of Cologne. It is a well-built town, pleasantly situated in a fine vale watered by the Wurm, and surrounded by the Venn Hills. It was formerly surrounded by ram-

parts, but these have been converted into pleasant promenades. It is well built, and though an ancient town has now quite a modern appearance. The market-place is adorned with a statue of Charlemagne in bronze. The town-house (built in 1353 on the ruins of Charlemagne's palace) contains the coronation room with portraits of the German emperors, half-sized portraits of Napoleon and the Empress Josephine, painted by David, and many relics of old German art. The nave of the cathedral, erected by Charlemagne as the palace chapel between 796 and 804, was rebuilt on the old model by Otho III. in 983, after having been almost destroyed by the Normans. It consists of an octagon, surrounded by a sixteen-sided gallery, and terminating in a cupola. The Gothic choir was begun in 1353 and finished in 1413; it is of prodigious height (114 feet), and lightness, and the large windows are filled with stained glass. Besides the tomb of Charlemagne, the cathedral contains many relics, the most sacred of which, such as the robe worn by the Virgin at the nativity, the swaddling-clothes of the infant Jesus, the scarf he wore at the crucifixion, &c., are shown only once every seven years, and attract many thousands of pilgrims from all countries. Aix-la-Chapelle contains three monasteries and about thirty churches, a handsome theatre, a public library, a gymnasium or higher grammar-school, a real-school, a polytechnic school for the Rhine countries and Westphalia, opened in 1870, and occupying a large and handsome building, three hospitals, two lunatic asylums, and other charitable institutions. As the chief station of the Belgo-Rhenish Railway, which connects it with Antwerp, Ostend, and Cologne, Aix-la-Chapelle affords an extensive mart to the commerce of Prussia; it is also a grain-market for Belgium, and the seat of commercial and other courts. It was eminent as a manufacturing city, especially of cloth and needles, as early as the twelfth century; and its prosperity in this respect still continues. Its woollen cloths are highly esteemed on the continent of Europe, and are also exported to America, China, &c. It is estimated that over 30 per cent. of the inhabitants are employed in the staple manufactures of the city, the chief productions of which, besides woollen yarns and cloths, are needles, machines, cards (for the woollen manufacture), railway and other carriages, tobacco, cigars, and chemicals; silk goods, hosiery, glass, soap, &c., are also manufactured. There is likewise a pretty large wholesale wine trade. Although, however, Aix-la-Chapelle is thus an extensive seat of manufactures, and has considerable commercial relations with France and Belgium, it derives its celebrity chiefly from its historical associations, and a considerable portion of its importance and prosperity from the influx of visitors to its baths. There are, in all, eight mineral springs here, six of them warm. The most famous is the imperial spring, or *Kaiserquelle*, which has a temperature of 143° Fahr., and the vapour of which, when confined, deposits sulphur. For the accommodation of strangers there are a number of bathing-houses. The rooms for bathing are excellently fitted up, with baths from 4 to 5 feet deep, built in massive stone, and in the old Roman style. About half a mile north of the city is the Louisberg or Lousberg, rising nearly 300 feet higher than the city. It is a favourite summer evening resort of the citizens. Several important congresses have been held here. The names of several streets, Alexander, Francis, Wellington Street, remind us of the Congress of Aix-la-Chapelle in 1818.

Aix-la-Chapelle was known to the Romans as early as the time of Cæsar, and is mentioned by Pliny under the name of Vetera. It was, after A.D. 768, the favourite residence of Charlemagne, who made it the capital of all his dominions north of the Alps, and spared no expense in beautifying it. Here he died in 814, and in the cathedral his tomb is marked by a large flat slab with the inscription, *Carolo Magno*. During the middle ages it was a free imperial city, and its citizens throughout the empire were exempt from feudal service, from attachment of their goods and persons, and from all tolls and taxes. Thirty-seven German emperors and eleven empresses have been crowned in this city, and the imperial insignia were preserved here till 1795, when they were carried to Vienna, and are now in the imperial treasury. By the peace of Lunéville (Feb. 9, 1801), which separated the left bank of the Rhine from Germany, the city was transferred to France, in whose possession it remained till 1814, when it was restored to Prussia. Pop. (1885), 95,725; (1905), 151,971.

AIX-LA-CHAPELLE, CONGRESS AT, an important congress held in October and November, 1818. By this congress the army of the allies, consisting of 150,000 British, Russian, Austrian, Prussian, and other troops, which, since the second peace at Paris, had remained in France to watch over its tranquillity, was withdrawn after France had paid the contribution imposed at the peace of 1815. Thus the Congress of Aix-la-Chapelle restored independence to France. See also the following article.

AIX-LA-CHAPELLE, TREATIES OF PEACE CONCLUDED AT. The first, May 2, 1668, put an end to the war carried on against Spain by Louis XIV. in 1667, after the death of his father-in-law, Philip IV., in support of his claims to a great part of the Spanish Netherlands, which he urged in the name of his queen, the infanta Maria Theresa, pleading the *jus devolutionis* prevailing among private persons in Brabant and Namur. Condé had already conquered Franche-Comté, and Turenne had taken ten fortresses, when the triple alliance, concluded by De Witt and Sir William Temple, determined France to make peace with Spain, on conditions which were agreed upon at St. Germain with the allies, and ratified at Aix-la-Chapelle. Spain had the option to surrender either the Franche Comté or the fortified places in the Netherlands. She chose to give up the latter. Thus France obtained a part of the ancient Burgundy, the Spanish fortresses Lille, Charleroi, Binch, Douai, Tournai, Oudenarde, and six others, together with their appendages. The second peace of Aix-la-Chapelle, October 18, 1748, terminated the Austrian war of succession in which the parties were at first Louis XV. of France and the Empress Maria Theresa, and, in the sequel, Spain, on one side, and Great Britain, Maria Theresa, and Charles Emanuel, king of Sardinia, on the other. In this war the united Netherlands were engaged as allies of Great Britain and Austria, Modena and Genoa as allies of Spain. Maria Theresa surrendered to Philip, infant of Spain, Parma, Piacenza, and Guastalla. Thus the fourth sovereign line of the house of Bourbon, that of Parma (from 1817 established in Lucca), took its origin. On the whole the state of possession before the war was restored, the pragmatic sanction and the succession of the house of Hanover in Great Britain guaranteed, and Silesia and Glatz secured to the King of Prussia. A Russian auxiliary army of 37,000 men, under Prince Repnin, in the pay of the naval powers, approaching, in the spring of 1748, from Bohemia to the Rhine, accelerated the conclusion of the peace. The plenipotentiaries of France, Great Britain, and the States General, in a secret session, April 30, 1748, signed the preliminaries, four copies of which were presented to the other powers engaged in the war, and signed by them separately. Charles Stuart, the eldest son of the Pretender, protested, at Paris, July 16, against the exclusion of his father, who

called himself James III., from the British throne. The above-named three powers first signed, in like manner, the definitive peace, whereupon Spain, Genoa, and Modena, July 20, and Austria, July 23, did the same.

AJACCIO, or AJAZZO, a town of France, capital of the department and island of Corsica, situated on the south-west coast of the island, on a tongue of land projecting into the Gulf of Ajaccio. It is sheltered by mountains from the north and east winds; and the town and bay are defended by a citadel. The entrance into the harbour is rendered unsafe by projecting rocks. Ajaccio is the birth-place of Napoleon, the house in which he was born is still in a state of good preservation, and has become the property of the nation. It is the handsomest city of Corsica, and the seat of a bishop. It contains a cathedral, a communal college, a public library, a botanical garden, &c. In the commercial world it is famous for its coral and sardine fisheries, and it has also a trade in wine, grain, olive-oil, and fruits. Pop. (1891), 18,846; (1901), 20,946.

AJAX (Greek, *Aias*), the name of two of the Grecian chiefs who fought against Troy, distinguished as Ajax Oïleus and Ajax Telamonius. The former, the son of Oïleus and Etiopis, a Locrian, was called the *Less*. He accompanied the expedition to Troy, because he had been one of the suitors of Helen. In the combat his courage sometimes degenerated into inconsiderate fury. When the Greeks, according to the story, had entered Troy, Cassandra fled to the temple of Pallas, from whence she was forced, and dragged along, bound as a captive. Some accounts add that she caught hold of the statue of the goddess, and that Ajax dragged her away by the hair; others that he violated the prophetess in the temple of the goddess. Ulysses accused him of this crime, when he exculpated himself with an oath. But the anger of the goddess at last overtook him, and he perished in the waves of the sea. The other Ajax was the son of Telamon, from Salamis, and a grandson of Æacus. He also was a suitor of Helen, and sailed with twelve ships to Troy, where he is represented by Homer as the boldest and handsomest of the Greeks, after Achilles. He understood not how to speak, but how to act. He was frank, and full of noble pride. After the death of Achilles, when his arms, which Ajax claimed on account of his courage and relationship, were awarded to Ulysses, he was filled with rage, and, driven to frenzy, threw himself on his sword, after having slaughtered the sheep of the Greek army, which he fancied were his enemies.

AJMERE, AJMEER, or AJMIR, an ancient city of India, capital of the province Ajmere-Merwara, and connected by railway with the chief Indian lines, is situated on the lower slope of Taragarh Hill, which is crowned with a fortress now used as a sanatorium for British troops. It is surrounded by a wall with five gates, and possesses many handsome streets, squares, and bazaars. Outside the walls is the fortified palace of Akbar, in which also Jehanghir and Shah Jehan resided, now occupied for government purposes. There are two institutions for higher education, the Ajmere College, affiliated to the Calcutta University, and the Mayo College, a college for the sons of Rajput noblemen. There is a mosque here which ranks as the finest specimen extant of early Mohammedan architecture. On the banks of an adjoining lake is the splendid garden of Jehanghir, where the British commissioner now resides. Ajmere has a good trade in cotton, grain, sugar, &c. According to tradition Ajmere was founded by a rajah named Aja in 145 A.D. Pop. in 1881, 48,735; in 1891, 68,843; in 1901, 73,839.

AJMERE-MERWARA, a British commissionership or province in India, directly under the Indian government, occupying an isolated position in Rajputana, surrounded by the Marwar, Jeypur, and Meywar agencies. It is divided into the two executive districts of Ajmere and Merwara, and has a total area of 2711 square miles. The surface is hilly, and even mountainous in the north and west, where there is a branch of the Aravalli range, but level in the south and east. The soil is partly fertile, but there occur large barren sandy plains. There are numerous water-tanks, to guard against a scarcity of water. The principal crops are bajra (a species of Holcus), wheat, barley, rice, sugar-cane. According to the mode of tenure which obtains in this province the better sorts of land belong to some village community, each member of which is responsible for the revenue exacted for his own share of land, yet so that the whole community becomes responsible when any individual is a defaulter. Among the agricultural population are many Jats, a people of good physique, and very active in improving their land. The higher classes are Rajputs. The capital is Ajmere. Pop. (1891), 542,358; (1901), 476,912.

AKABAH, GULF OF, an arm of the Red Sea, on the east side of the Peninsula of Mount Sinai, which separates it from the Gulf of Suez. It extends nearly 100 miles in a straight direction N.N.E., being in general about 9 or 10 miles wide, and, where broadest, 16 or 17 miles. It has the appearance of a deep narrow ravine, the circumjacent hills rising, in some places, 2000 to 2500 feet perpendicularly from the shore. It is subject to sudden storms, and its navigation is rendered difficult by shoals and rocks. The village of Akabah is situated at the northern extremity of the gulf, and is supposed to be the *Ezion-geber* of the Old Testament. It is now remarkable only for its date-groves, some of which are a mile in length.

AKALZIK, ACHALZIK, or AKISKA, a town of Russia, capital of the district of the same name, in the Trans-Caucasian government of Tiflis, about 90 miles west of Tiflis and 70 east of Batoum, near the Kur. It is defended by a citadel, in which there is a beautiful Russian church, formerly a mosque. There are also several Armenian churches, and a synagogue. The town was taken by the Russians under Field-marshal Prince Paskevich on the 27th of August, 1828, and on coming into Russian hands it naturally ceased to be what it then was, the chief place of sale of Georgian boys and girls. The name Akalzik signifies New Castle. Pop. 16,000.

AKBAR, or AKBER (that is, 'very great'), JELLALADIN MOHAMMED, Mogul emperor, one of the greatest native rulers of India. He was born at Amerkote, in Sind, in the year of the Hejra 949 (1542 of the Christian era), and after the death of his father, Humayun, ascended the throne at the age of thirteen, and governed India under the guardianship of his minister, Beyram. Finding the regent's authority degenerating into tyranny, however, the young prince displaced him, and took the chief power into his own hands (1560). His great talents were early developed. He fought with distinguished valour against his foreign foes and rebellious subjects, among whom was Beyram himself. All his enemies he conquered, and he extended the limits of the empire further than they had ever been before, although on his accession they embraced only a small part of the Mogul Empire as it had formerly existed. His government was remarkable for its mildness and the greatest tolerance towards all sects. Though compelled by continued commotions to visit the different provinces of his empire at the head of his army, he loved the sciences, especially history, and was indefatigable in his attention to the internal administration of his empire. He

instituted inquiries into the population, the nature, and productions of each province. The result of his statistical labours, as well as a history of his reign, were collected by his minister, Abul Fazl, in a work called Akbar-Nameh, the third part of which, entitled Ayini-Akbari, was published in an English translation at Calcutta (1783–86, three vols.), and reprinted in London. In religion he was at first a Mussulman, but he afterwards abandoned this creed and adopted a system of pure deism, together with a ritual based on that of Zoroaster. Akbar died after a reign of forty-nine years (the last of which were troubled by the vices of two of his sons, and the rebellions of a third, Selim, who succeeded him under the name of Jehanghir), in the year of the Hejra 1014 (1605 A.D.). His splendid sepulchral monument still exists at Sicandra, near Agra.

AKEE (*Blighia sapida*), a tree belonging to the natural order Sapindaceæ, much esteemed for its fruit. The leaves of the tree are somewhat similar to those of the ash; the flowers are small and white, and are produced in branched spikes. The fruit is oblong, ribbed, and compressed in the middle, of a dull orange colour, and contains several large seeds, to the end of which is attached a rich and slightly acid arillus, which is the part eaten. A decoction of the fruit with sugar and cinnamon is used as a remedy in diarrhœa. The akee is a native of Guinea, from whence it was carried to Jamaica by Captain Bligh in 1793. In the same year it was introduced into England. It has grown well in the West Indies.

AKEN, or ACKEN, a Prussian town in the province of Saxony, in the government of Magdeburg, on the left bank of the Elbe, 9 miles northward from Köthen. It has manufactures of tobacco, cloth, and leather, &c. There is also some shipping and other commerce, and extensive manufactories of beet-root sugar in the neighbourhood. Pop. (1900), 7358.

AKENSIDE, MARK, a poet and physician, was born on the 9th of November, 1721, at Newcastle-upon-Tyne. He was the son of a butcher, and was sent by his father to the University of Edinburgh to qualify himself for the Presbyterian ministry, but chose the study of medicine instead. After three years' residence at Edinburgh he went to Leyden, and in 1744 became Doctor of Physic. In a thesis which he published on receiving his degree, De Ortu et Incremento Fœtus Humani, he proposed a new theory, which has been since confirmed and received. In the same year he published the Pleasures of Imagination, which, however, he is said to have written during his residence at Edinburgh. In the following year he published a collection of odes, and the Epistle to Curio, a satire on Pulteney. After having unsuccessfully attempted the practice of his profession at Northampton and Hampstead, he was invited to London by his friend Mr. Dyson, clerk of the House of Commons and secretary to the treasury, from whom he received a pension of £300 a year. Here he became a fellow of the Royal Society, was admitted into the College of Physicians, and in 1755 read the Gulstonian lectures in anatomy, and in 1756 the Croonian lectures, but never obtained a very extensive practice. He was, however, in 1759, appointed first assistant and afterwards head physician to St. Thomas's Hospital. While at London he wrote little poetry, but published several medical essays and observations. He died in 1770, being engaged at the time of his death in preparing a new version of his Pleasures of Imagination. The place of Akenside as a poet is not very high, though his Pleasures of Imagination is one of the most pleasing didactic poems in our language. There is a life of Akenside by Bucke (London, 1832).

AKERMAN, or AKJERMAN (ancient *Tyras*), a seaport town in Russia in Europe, in the government of Bessarabia, near the mouth of the Dneister in the Black Sea. The port is good, and is commanded by an old dilapidated citadel, which, when the town was under Ottoman sway, contained a strong garrison. The vicinity produces fine grapes, from which excellent wine is made. Large quantities of salt are made from extensive saline lakes in the neighbourhood. There is a trade in salt, wine, tallow, wool, &c. A treaty was signed here, Oct. 6, 1826, between Russia and the Porte, by which the former was secured in the free navigation of the Black Sea; a greater measure of independence was obtained by the principalities of Moldavia, Walachia, and Servia; and Russia was to retain the Turkish fortresses in Asia that were already held by it. The inhabitants are chiefly Greeks, Jews, and Armenians. Pop. (1897), 28,303.

AK-HISSAR ('White Castle'), a town in the west of Asia Minor, in the vilayet of Aïdin, 46 miles north-east of Smyrna, with which it is now connected by railway, in a fertile and well-watered district. Ak-hissar occupies the site of the ancient Thyatira, and teems with relics of that city, comprising fragments of carved stone, so abundant that in many places the streets of the modern town are paved with them; while many of the wells are formed of pieces of Corinthian pillars, the bucket being drawn through holes cut in the centre. Here the Emperor Valens defeated the usurper Procopius in 366, and Murad defeated the Prince of Aïdin in 1425. Pop. about 8000.—There is another AK-HISSAR, in European Turkey, in the vilayet of Skutari, 21 miles north-west of Durazzo. It has manufactures of leather and weapons. There is here a citadel on the top of a rock, dating from 1338. Pop. 6000.

AKHTIRKA, or AKHTYRSK, a town in Russia, in the government of Kharkov, and 56 miles north-west of the town of Kharkov. It stands on the river Akhtirka and two lakes, and contains a fine cathedral in which is a celebrated image of the Virgin which attracts many pilgrims. There are manufactures of woollens, and important markets. The environs are fertile, and the orchards produce excellent plums and cherries. Akhtirka was founded by the Poles in 1641. Pop. (1897), 23,390.

AKMOLLINSK, a province in Asiatic Russia, the north-westmost and largest of those into which the general government of the Steppes is divided, with an area of 230,000 square miles. The northern and southern portions contain steppes and wastes, the middle is mountainous. The chief rivers are the Ishim in the north and the Sari-Su in the south, both of which take their rise in the east. Pop. in 1897, 683,721.

AKMOLLINSK, a town in Asiatic Russia, capital of the province of the same name, on the river Ishim, founded in 1862. It has acquired some importance as the meeting-place of the caravans from Tashkend and Bokhara. Pop. about 6000.

AKOLA, a town in India, in West Berar, the residence of the commissioner, on an affluent of the Purana, 150 miles west by south of Nagpur. Its lofty and well-constructed walls, and the numerous ruins contiguous to it, indicate a former magnitude and importance which do not now exist; but it has recently greatly increased in importance. It is a station on the Great Indian Peninsular Railway system. Akola has a town-hall, courts, jail, church, and mission station, &c. The chief trade is in cotton. Pop. (1891), 21,470; (1901), 29,289.

AKRON, a town in the United States, capital of Summit county, Ohio, on the Ohio and Erie Canal, and on the Cleveland and Zanesville Railway, 100 miles north-east of Columbus. It occupies an elevated site about 400 feet above the level of Lake

Erie; and being furnished with ample water-power by the Little Cuyahoga, possesses a number of large flour-mills, as well as woollen factories, and manufactures of rubber goods, pottery, &c. In the vicinity beds of mineral paint are worked. Natural gas is also utilized. Pop. (1890), 27,601; (1900), 42,728.

AKSU, a town of Chinese Turkestan, 300 miles east by north of Kashgar. It is situated in the valley of the Aksu, at the termination of a road leading across the Thian Shan Mountains, by a pass more than 10,000 feet high, to the province or district of Ili, with which it carries on an extensive trade. It is a flourishing place, being much resorted to by caravans from all parts, and being a convenient place of exchange for the merchants of Russia, China, and Tartary. It is celebrated for its manufactures of cotton cloth and saddlery. Aksu was formerly the residence of the kings of Kashgar and Yarkand, and the ruler of Eastern Turkestan also resides here occasionally. In 1716 it was nearly destroyed by an earthquake, and in the beginning of the present century suffered severely from an inundation, by which 3000 persons perished. There is said to be a mine of rubies near Aksu, but not worked. The population may be estimated at upwards of 30,000.

AKYAB, a seaport of Lower Burmah, capital of the province of Arracan, founded in 1826. It stands on the west side and near the mouth of the Kolladan or Akyab River, and from its situation possesses great trading facilities, one principal article exported being rice of an excellent quality. It has a good harbour, and enjoys direct steam communication with Calcutta. Pop. (1891), 37,938; (1901), 35,680.

ALABAMA, a river in North America, formed near Montgomery, in the state of Alabama, by the junction of the Coosa and the Tallapoosa. It flows west and then south to its junction with the Tombigbee, about 50 miles above Mobile Bay, when it assumes the name of the Mobile, and falls into the Bay of Mobile on the Gulf of Mexico. Steamboats ascend to Montgomery, 320 miles; but the navigation is interrupted during the season of low water. Some of the largest cotton plantations of America are situated on its banks.

ALABAMA, one of the United States of North America, bounded on the north by Tennessee, on the east by Georgia, on the south by Florida and the Gulf of Mexico, and on the west by Mississippi. Its greatest length from north to south is 333 miles; its uniform length between Tennessee and Florida 277 miles; its greatest breadth 200 miles; and its area 52,250 square miles. The southern part of the state, which borders on the Gulf of Mexico and Florida, over a space of 50 or 60 miles in width, is low and level, and wooded with pine, cypress, and loblolly; the middle is hilly, with some tracts of level sand or *prairies;* the north is broken and mountainous. The district is intersected by the rivers Alabama, Tombigbee, Mobile, Black Warrior, Coosa, Tallapoosa, Tennessee, Chatahoochee, Perdido, and Cahawba, some of which are navigable by steamers for several hundred miles. The soil is various, being in some places, particularly in the south, sandy and barren; in others fertile. On the margin of the rivers there is some rich land; beyond, the ground is low, wet, and interspersed with stagnant pools. Next to this river swamp, and elevated 10 or 15 feet above it, there lies an extensive tract of level land, composed of a black rich mould, and covered with wood. To this succeed the *prairies*—wide-spreading plains, or gently undulating land, without timber, and clothed with grass, herbage, and flowers. The climate in the south of the bottom land skirting the rivers, and of the country bordering on the mussel shoals of the Tennessee, is unhealthy. In the more elevated parts it is more salubrious, the winters being mild and the summers tempered by breezes from the Gulf of Mexico. Its staple production is cotton, especially in the south, where rice and sugar are also grown; in the north the cereals (above all maize) are the principal crops; but tobacco is also an object of cultivation. In the north-eastern part of the state there are extensive beds of iron and lead ore, manganese, ochre, beautiful marble, granite, and bituminous coal; and coal and iron mining, and the smelting and working of iron have latterly become industries of high importance. The manufacture of cotton goods is extensively carried on. Trade and shipping have been especially thriving since 1870. The foreign trade is concentrated in Mobile, where cotton is the principal export, although much wood is sent to Cuba, and considerable quantities of cedar timber are despatched to the north. There is an extensive system of railways.

The legislative power is vested in a senate, consisting of thirty-three members elected for four years, one-half going out every two years, and a house of representatives, consisting of 100 members elected for two years, chosen by universal suffrage, and, together, forming the *General Assembly* of the state. The governor, in whom the executive power is vested, is elected for two years. The state sends eight representatives to the chamber of deputies of the Congress of the United States. Its principal towns are Montgomery, now the seat of government, and Mobile, the chief port. A well-devised system of education was established in 1868. The public schools are free to all between the ages of 5 and 21. There is a state university at Tuscaloosa, and there are several state normal colleges, besides professional schools, &c., in the principal towns. Pop. in 1860, 964,201; in 1870, 996,992; in 1890, 1,513,017; in 1900, 1,828,697.

ALABAMA, THE, a war-vessel which belonged to the Confederate States of America during the civil war of 1861–65, and which inflicted great damage upon the shipping of the Federal States, besides giving rise to a claim for damages by the United States upon Britain. The *Alabama* was built for the Confederate government in 1862 by the Messrs. Laird of Birkenhead, and was a wooden screw steam-vessel with two engines of 350 horse-power each, barque-rigged, 1040 tons burden, and pierced for twelve guns. While she was being built her destination was carefully concealed, but before she was quite finished it had oozed out that she was intended for a Confederate war-vessel, and the minister of the United States, laying evidence tending to prove this before the British government, requested that she should be detained. The crown lawyers, after some delay, pronounced in favour of her detention; but by this time the vessel was gone, having left England on the very day on which she was to be seized. She received her armament (eight 32-pounders) and stores at the Azores, took her commander, Captain Semmes, on board, and was now named the *Alabama*, having hitherto been known simply as 'No. 290'—her number in the list of vessels constructed by Messrs. Laird. She now commenced her destructive career, capturing and burning merchant vessels till she was sunk in a fight with the Federal steamer *Kearsarge* off Cherbourg harbour, June 19, 1864. Captain Semmes and many of her crew were saved, partly by the boats of her opponent, partly by an English yacht. English lawyers did not consider that the government had been guilty of any breach of law in allowing the *Alabama* to escape, or in its relations with other Confederate cruisers (though perhaps the neutrality laws may have been somewhat defective); but the Americans have held that it was by British negligence that the loss to their shipping was caused, and early

intimated their intention to hold England liable for damages, not only on account of the injury it had inflicted, but also on account of the loss that the Federals had suffered from various other vessels belonging to the Confederates, that had either been built, supplied, or recruited in English ports or waters. After a great deal of diplomatic correspondence, and various attempts at a settlement, it was at last agreed between Britain and the United States (by treaty of May 8, 1871, in which Britain accepted three new rules having a retrospective action, defining the duties of neutrals in such cases as those which formed the subject of those negotiations) to submit the cases of both parties to arbitration—the arbitrators, five in number, to be named by Britain, the United States, Switzerland, Italy, and Brazil. An amicable settlement now seemed at hand, but the preposterous claims proposed to be submitted to the arbitrators by the American government, not merely for direct losses, but for indirect losses, caused by the operations of the *Alabama* and other cruisers, as well as by the general conduct of Britain during the war, for some time rendered this good result doubtful. These claims being at once disallowed by the arbitrators, who met at Geneva in September, 1872, the adjudication proceeded, and on the 14th of the same month an award was given finding Great Britain liable to the United States in damages to the amount of 15,500,000 dollars, or about £3,229,166. The vessels on account of whose acts the damages were awarded were the *Alabama*, *Florida*, and *Shenandoah*. See Official Correspondence on the Claims in respect to the Alabama (London, 1867); American Opinions on the Alabama (New York, 1870); and Opinion impartiale sur la question de l'Alabama, by Bluntschli (Berlin, 1870).

ALABASTER, a name applied to two substances, the one a stalagmitic or stalactitic carbonate of lime, the other a kind of gypsum or sulphate of lime. The first is often called oriental alabaster, and is that which is mentioned in the New Testament. It arises in caves in limestone mountains, and is a translucent stone of a yellowish milky colour or of a deeper tinge of yellow, and sometimes marked with lighter and darker streaks like an onyx. It is found in the cave of Antiparos, the Baumann's cave in the Hartz, and is now worked in the province of Oran in Algeria. The gypseous alabaster has a fine granular texture, and is usually of a pure white colour. It is softer than the other alabaster, indeed so soft that it may be scooped out with the nails; while the other kind cannot be so treated. It is found in many parts of Europe; in great abundance and of peculiarly excellent quality in Tuscany. In England it is found principally in Derbyshire and Staffordshire; but it is also to be met with in other counties as well as in Wales and Ireland. Moulds and casts from statues and other sculptures are formed from this valuable material, and also a very strong cement for the use of the sculptor and mason to form the close joints of marble; plasterers also use it much, particularly for mouldings and foliage. Many museums contain ancient vases and similar articles of alabaster, for which the Romans often employed this material.

ALAGOAS, a maritime state of Brazil, deriving its name from several coast lakes or lagoons (*alagoas*) for which it is noted. It is bounded on the north and west by the state of Pernambuco, on the south by that of Sergipe, and on the east by the Atlantic; area, 11,640 square miles. The above-mentioned lakes, individually of no great extent, are frequented by a great variety of birds; and in the west are several ridges of hills, none of them of great elevation, but generally well wooded, and inhabited by abundance of game and other animals. From the extent of surface covered by lakes and by forests the climate of Alagoas is on the whole moist. The plains near the sea are generally sandy, and not very fertile; but inland the soil is good, producing, besides tobacco, cotton, and sugar, which are exported to Bahia and Pernambuco, rice, cocoa-nuts, mangoes, oranges, jack-fruit, and abundance of fine timber used for ship-building in the above-named ports and in Maçeio. The forests furnish excellent building and dye woods, and much ipecacuanha. Limestone, granite, and various kinds of clay abound in the state. Pop. in 1908, 785,000. See next article.

ALAGOAS, a city and seaport of Brazil, in the state of the same name, on the coast of the Atlantic, and on the south side of an arm of the sea named Mandau, and about 20 miles distant from Maçeio. It is built on an elevated situation, and being adorned with lofty mango-trees, has an extremely picturesque appearance when viewed from a distance, but does not improve on a nearer inspection. The town has fallen off since the seat of local government was transferred in 1839 to Maçeio, and is now to a great extent deserted.

ALAIS, a town of France, on the Gardon d'Alais, at the foot of the Cevennes, in the department of Gard, 87 miles north-west of Marseilles. It has few buildings of any consequence, and owes its prosperity to the seams of coal and iron in its vicinity. Both are worked to some extent, and there are also extensive lead-mines. The principal manufactures are glass, silk, and leather. The chalybeate springs in the vicinity have many visitors during the autumn months. Pop. (1891), 18,961; (1906), 20,151.

ALAJUELA, a town of Central America, in the state of Costa Rica, 25 miles north-west of Cartago. Some of the houses have a handsome appearance. It is connected by railway with the port of Limon on the Atlantic side, and by road with Punta Arenas on the Pacific. The inhabitants, about 10,000, are chiefly employed in growing sugar.

ALAMANNI, Luigi, a famous Italian poet, born at Florence in 1495, of one of the noblest and most distinguished families of the republic. His father was zealously devoted to the party of the Medici, and he himself stood in high favour with the Cardinal Giulio, who governed in the name of Pope Leo X.; but conceiving himself to have been injured, he joined a conspiracy formed against the life of the cardinal. The plan was discovered; Alamanni fled to Venice, and when the cardinal ascended the papal chair, under the name of Clement VII., he took refuge in France. But the misfortunes which befell this pope giving Florence an opportunity to become free, Alamanni returned thither in 1527. His country sent him on an embassy to Genoa. Here he became the friend of Andrea Doria, with whose fleet he went to Spain. Charles V. soon after sailed in the same fleet from Spain to Italy to arrange the affairs of Florence and subject it to the Medici. After this new revolution Alamanni, proscribed by the Duke Alessandro, went to France (1530), where the favours of Francis I. retained him. Here he composed the greater part of his works. The king esteemed him so highly that after the peace of Crespy in 1544 he sent him as ambassador to the Emperor Charles V. Alamanni discharged his office with great skill. He was held in like estimation by Henry II., who also employed him in several negotiations. He followed the court and was with it at Amboise, when he was attacked with dysentery, which terminated his life in 1556. His principal works are Opere Toscane, a collection of his minor poems (eclogues, psalms, satires, elegies, fables, &c.), part in hendecasyllabic blank-verse (*versi sciolti*), the invention of which is contested with him by Trissino; a didactic poem, La Coltivazione, to which

he is mostly indebted for his fame; Girone il Cortese, a heroic poem in twenty-four cantos from an old French poem of the same name; L'Avarchide, an epic in which he describes, in a few happy imitations of Homer, the siege of the city of Bourges (Avaricum), likewise in twenty-four cantos; Flora, a comedy in triple rhymes (*versi sdruccioli*); and a number of epigrams. An edition of his works, edited by Raffaelli, appeared at Florence in two vols. in 1859. The writings of Alamanni are recommended by ease, perspicuity, and purity of style, but often want strength and poetic elevation.

ÅLAND (pronounced *Oland*) ISLANDS, a group of about eighty islands and islets, situated between the Gulf of Bothnia and the Baltic Sea, and near the mouth of the Gulf of Finland; area, 468 square miles. The navigation amongst them is rendered difficult by the narrowness and shallowness of the channels. The principal islands are Åland, which is the largest, and gives name to the group, Lemland, Lumparland, Ekeroe, Fogloe, Kumlinge, Braendoe, Vordoe, and Hannoe. The whole group is composed mainly of red granite, with here and there strata of red marl and limestone. Åland, distant about 30 miles from the Swedish coast, is 25 miles long and about 22 broad. Wheat, barley, and rye are raised here, as in some of the other islands, in sufficient quantities for the supply of the inhabitants. In this island there is a harbour capable of containing the whole Russian fleet. The inhabitants employ themselves to a great extent in fishing and catching seals, which abound on their coasts. The chief towns are Åland, on the island of the same name, founded by the Russians, and Castelholm, with the ruins of a citadel. The inhabitants are entirely of Swedish extraction. The islands formerly belonged to Sweden, but are now included in the government of Finland, having been ceded to Russia in 1809. Pop. estimated at 16,000, of whom 9000 belong to the island of Åland.

ALANI, or ALANS, one of the warlike tribes which migrated from Asia westward at the time of the decline of the Roman Empire. They are first met with in the region east of Mount Caucasus, where Pompey fought with them. From this centre they spread over the south of modern Russia to the confines of the Roman Empire. They were engaged in war with Rome in the time of Hadrian, but were defeated by Arrian, the general of that emperor. Marcus Aurelius had much difficulty in keeping them out of the empire, and Tacitus concluded a treaty with them (275 A.D.). About a century later those on the banks of the Lower Danube were conquered by the Huns, after which most of them joined the ravaging expeditions of that people. They accompanied Rhadagais on his march into Italy, and after his defeat they settled first on the Rhine, afterwards (about 411) in modern Portugal. Being there completely defeated by the Visigoths, they joined the Vandals, among whom they become lost to history.

ALARCON Y MENDOZA, DON JUAN RUIZ DE, one of the most distinguished dramatic poets of Spain, though in modern times his merits have been somewhat unaccountably overlooked. He was born at Tasco in Mexico about the beginning of the seventeenth century, and came to Europe about 1622. In 1628 he published two volumes, one containing eight and another twelve dramas. They are all characterized by numerous poetical beauties. One of them, called La Verdad Sospechosa, furnished Corneille with the groundwork and greater part of the substance of the Menteur. He died in 1639. A German version of this play is to be found in the seventh volume of the Spanisches Theater of Rapps. (Hildburghausen, 1869).

ALARD, MARIE JOSEPH LOUIS, born at Toulouse in 1779, became an army surgeon in 1794, returned to Paris and took his degree in 1803, and afterwards rose gradually during the course of a long life to the summit of his profession. He was for a long time chief editor of the Bulletin des Sciences Médicales, and published several medical works of high reputation. He died in 1850.

ALARIC, King of the Visigoths, one of the conquerors who ravaged the Roman Empire. History first mentions him about A.D. 395 (three years before he was elected king), when the Goths were united with the armies of Theodosius the Great in order to repel the Huns, who menaced the Western Empire. This alliance disclosed to Alaric the weakness of the Roman Empire, and inspired him with the resolution of attacking it himself. The dissensions between the two sons and successors of Theodosius, Arcadius and Honorius, and their ministers, Rufinus and Stilicho, facilitated the execution of his purpose. He first attacked Arcadius in the East, but when Stilicho, the minister of Honorius, came to the aid of the eastern provinces the jealousy of Arcadius led him to make peace with Alaric, and even to appoint him governor of Eastern Illyria. Alaric then invaded Italy, but the brave Stilicho routed him first at Pollentia, a town in Liguria at the confluence of the Stura and Tanarus, and afterwards near the modern Verona. Both battles were fought in 403. A few years later he concluded, by the mediation of Stilicho, a compact with Honorius, conformably to which he was to advance to Epirus, and from thence to attack Arcadius, in conjunction with the troops of Stilicho, receiving for his services a sum of 4000 lbs. of gold yearly. After the death of Stilicho, however, the Roman government refused to carry out this compact, whereupon Alaric advanced with an army to Italy and invested Rome (408). The city was saved only by consenting to pay a heavy ransom. Negotiations took place between Honorius in Ravenna and Alaric, with a view of putting an end to the war; but the parties could not agree, and Alaric besieged Rome a second time (409). By cutting off the supplies of the city he soon compelled a capitulation, by virtue of which the senate declared the prefect of the city, Attalus, emperor instead of Honorius. But Attalus evinced so little prudence that Alaric obliged him publicly to resign the empty dignity. Negotiations again took place with Honorius, but were as unsuccessful as the former, and Alaric besieged Rome for the third time. The city having been delivered into his hands by the treachery of some slaves, the Goths penetrated into it, sacked it, burned a part of it, and destroyed a great quantity of ancient works of art (410). But the moderation of Alaric is praised because he gave orders to spare the churches and those who had fled to them for shelter. The treasures collected during a thousand years from all quarters became the prey of the barbarians. Alaric left Rome after a residence of six days, with the view of reducing Sicily and Africa, but death overtook him at Cosenza, a Calabrian town, A.D. 410. Rome and Italy celebrated public festivals on the occasion, Sicily and Africa saw themselves freed from imminent danger, and the world enjoyed a moment of peace. But the march of desolation was soon renewed; the barbarians had learned the way to Rome; Alaric had taught them the weakness of the former queen of the world.

ALARIC II., King of the Visigoths from 484 to 507 A.D. At the beginning of his reign the dominions of the Visigoths were at their greatest extent, embracing three-fourths of the modern Spain and all Western Gaul to the south of the Loire. His capital was Toulouse. He was a good ruler, but was not of a warlike disposition, and when Clovis made his con-

quests in Gaul sought rather to come to a peaceful understanding with him than to resist him by force of arms. On one occasion he had a meeting with Clovis on an island in the Loire, but it had no other result than to free Clovis from the danger of being attacked in the rear while he was engaged with his enemies in the east. Once he had fairly established himself in his conquests in Northern and Eastern Gaul he determined to invade the kingdom of the Visigoths, alleging that 'he could not bear to see a part of Gaul in the hands of Arians', as the Visigoths at that time were. This invasion was favoured by the orthodox clergy throughout Gaul, even those who were subjects of Alaric, although they were treated by him with perfect toleration. In the battle of Vouglé or Vouillé, not far from Poictiers (507), Alaric was slain and his army completely defeated. The greater part of his dominions in Gaul fell in consequence into the hands of Clovis. The Breviarium Alaricianum, a code of laws derived exclusively from Roman sources, was compiled by a body of Roman jurists, presided over by a Visigothic count, at the command of Alaric.

ALA-SHEHR (ancient *Philadelphia*), a town in Turkey in Asia, in the vilayet of Aïdin, 76 miles east of Smyrna, on the lower part of the northern slope of Mount Tmolus, famous as the seat of one of the first Christian churches. It is of great extent, but the houses are mean, and the streets narrow and dirty. A vast number of interesting remains of antiquity are scattered about the town, consisting of fragments of beautiful columns, sarcophagi, fountains, &c. Philadelphia was built by Attalus Philadelphus, king of Pergamos, and is still, under its modern name, a place of some importance, having an active trade with Smyrna, to which there is railway communication. It did not fall into the hands of the Turks till 1390, after it had resisted twenty sieges. It was the last important town of Asia Minor that was captured. Pop. 15,000.

ALASKA, a territory belonging to the United States, comprising all that portion of the north-west of North America which lies west of the 141st meridian of west longitude, together with an irregular strip of coast-land (and the adjacent islands) extending south to lat. 54° 40′ N., and lying between the British territories and the Pacific. It also includes the Aleutian Islands, as well as the Pribyloff and other islands in Behring Sea. The total area is computed at 586,400 square miles, of which the islands occupy more than 30,000. The territory is watered by several rivers, the principal of which are the Yukon and the Kuskoquim. The former is a great stream that rises in Canada, and traverses the whole territory. It is now navigated by steamers, and small stern-wheelers can ascend it for 1500 miles to Fort Selkirk in Canada. The principal mountains of Alaska lie south of the Yukon, and form a number of complicated ranges or systems, extending also into the Peninsula of Alaska. Among them are a number of volcanic peaks, ten of which are active. Mounts Wrangell and M'Kinley (20,460 feet), with St. Elias on the Canadian frontier, are among the loftiest summits. There are here immense glaciers. The climate of the interior is very severe in winter, but in summer the heat is intense. The climate of the Pacific coast districts is mild but moist, and in the south indeed 'intolerably rainy'. Alaska produces excellent timber, in particular the Sitka spruce and the yellow cedar (*Cedrus Nutkatensis*), the most valuable wood on the Pacific coast. Numbers of fur-bearing animals inhabit the coasts or the interior, such as the fur-seal, sea-otter, beaver, fox, mink, marten, &c.; and the fur trade has long been valuable. The right of catching fur-seals in Behring Sea has been a question of some trouble between the United States and Britain. Gold is mined in various places, especially on the upper Yukon. The famous Klondike mines are on this river just within the Canadian frontier. Coal is obtained at various places. The coasts and rivers swarm with cod, salmon, and other fish, and salmon are caught and canned. The aboriginal inhabitants consist of Esquimaux or allied tribes and Indians. Alaska formerly belonged to Russia, but was made over to the United States in 1867 by sale for a sum of 7,200,000 dollars. Juneau, on an inlet of the Pacific, is the capital, and an important place of trade. Sitka and Nome may also be named as trading centres. There are several more or less difficult routes to the Yukon gold-fields, far the longest being by the river itself—the only available route for heavy goods. Much gold is being obtained. Pop. of territory in 1900, 84,901.

ALATRI, a town of Italy, prov. of and 44 miles east by south of Rome, in the district and about 6 miles north of Frosinone. It represents the ancient Aletrium, and is a picturesquely situated and interesting place, with old gates and a castle, the latter built of huge polygonal blocks of stone. Pop. 6000.

ALATYR, a town in Russia, in the government of Simbirsk and 82 miles W.N.W. of the town of Simbirsk, at the confluence of the Alatyr with the Sura. The houses are constructed of wood. The town has a considerable trade. Pop. 15,000.

ALAVA, a hilly province in the north of Spain, one of the three Basque provinces, bounded north by Biscay, north-east by Guipuzcoa, east by Navarre, south by Old Castile, and west by Santander; area, 1207 square miles. The general features of this province are very rugged, branches of the great Pyrenean chain ramifying throughout its length and breadth, and forming a natural boundary between Alava and the other two Basque provinces—Biscay and Guipuzcoa. The slope of the province is southward towards the Ebro, which bounds it on the south. The mountains are clothed with oak, chestnut, holly, pine, and other hardy timber, and the valleys yield various grains, especially maize, the staple food of the inhabitants, vegetables, flax, hemp, and abundance of fruits of excellent quality. Wine is plentiful, but inferior. The chief occupation of the people is husbandry, but iron and copper are worked, and salt springs furnish an important article of export. Education is little attended to. The capital is Vittoria. Pop. (1897), 94,622. See BASQUES, BISCAY.

ALB, a vestment worn by Roman Catholic priests, and also by some clergy of the Anglican church, in the service of the eucharist. It is a long robe of white linen reaching to the feet, bound round the waist by a cincture, and fitting more closely to the body than the surplice.

ALBA, the name of several towns in ancient Italy, the most celebrated of which was Alba Longa, a considerable city of Latium, according to tradition built by Ascanius, the son of Æneas, 300 years before the foundation of Rome. It was at one time the most powerful city of Latium, and the head of a league of the Latin cities, but ultimately fell under the dominion of Rome, when the town was destroyed and the inhabitants removed to Rome. In later times the site of the ancient Alba Longa became covered with villas of wealthy Romans, whence arose the municipium of Albanum, now Albano (which see). Another Alba, called Alba Fucentia or Fucentis, was near the Lacus Fucinus. The cyclopean walls of the old town are still to be seen in excellent preservation, as well as several other ancient remains.

ALBACETE, a town in Spain, capital of the province of the same name, on the highway between

Madrid and Cartagena, on an important line of railway. It lies in a fertile but treeless plain. The most noteworthy buildings are the parish church, of the sixteenth century; the chapter-houses; the palace de Pino-Hermoso; and the bull-ring. Albacete, from its position, is a place of considerable business; and carries on trade, both direct and transit, with Murcia, Alicante, Valencia, and Madrid, exporting grain, saffron, and cattle; and importing codfish, sardines, rice, sugar, wine, iron, cloths, &c. A good deal of cutlery is made here, especially the knives and daggers so common among Spaniards. Pop. (1897), 21,637.—The province of Albacete is partly in Murcia, partly in New Castile. It has an area of 6170 square miles. The surface is considerably varied, presenting in some parts lofty sierras, in other parts rich plains and arable land. The main occupation is agriculture. Pop. (1897), 233,005.

ALBA LONGA. See ALBA.

ALBANI, FRANCESCO, a famous painter, born at Bologna in 1578, entered the school of Dionysius Calvaert, a Flemish painter, who had a great reputation in Bologna. Albani was one of his most distinguished scholars, but quitted him for Ludovico Carracci, under whose instruction he made rapid progress. He laboured here several years in connection with Domenichino, to whom he was closely attached by friendship and love of art; and some resemblance is perceptible in their manner of colouring. But in invention he surpasses his friend, and indeed all his rivals of the school of Calvaert. His female forms Mengs places above those of all other painters. Among the best known of his compositions are the Sleeping Venus, Diana in the Bath, Danaë Reclining, Galatea on the Sea, Europa on the Bull. Scriptural subjects he has less frequently selected, and when he has, the paintings are principally distinguished for the beauty of the heads of the angels. He had a numerous school in Rome and Bologna. The scholars of Guido, with whom he vied, accused him of effeminacy and weakness of style, and maintained that he knew not how to give any dignity to male figures. He has been called the *Anacreon* of painters. He died in 1660.

ALBANIA, an extensive region in the south-west of Turkey in Europe, about 290 miles in extreme length, and in breadth varying from about 90 to about 50 miles. It lies on the Adriatic, and has on the north Montenegro and Bosnia, on the east Roumelia and Thessaly, on the south the Kingdom of Greece. In the autumn of 1881 a considerable portion in the south, inhabited mainly by Greeks, was transferred to Greece, in accordance with a convention concluded between Turkey and Greece at the instance of the great powers in June 1881. The boundary on the east is formed by a range of mountains, which, generally speaking, also constitutes the water-shed, and in the north is called Shar Dagh or Scardus, farther south Grammos and Pindus. The country is divided from north to south into Upper, Central, and Lower Albania. It is composed of at least nine ridges of hills of which six are in Lower Albania (the ancient Epirus) and the remainder in Central and Upper Albania (Albania proper). The hills in Central Albania are comparatively low, while those in Upper Albania are the loftiest in the country, some in the latter district and Lower Albania having snow on them nearly nine months of the year. There are no large rivers in Albania, and in summer many of the streams have scarcely any water, or are even completely dry. The Drin or Drino is the largest. It is formed by the White Drin rising on the Bosnian frontier, and the Black Drin issuing from Lake Ochrida. These flow respectively from the north and south, and after their junction the river's course is west till it falls into the Adriatic. Other rivers are the Boyana, Beratino, Voyussa, Kalamas, and Arta. Albania contains many subterranean streams and cavities, with ponds and water-courses that disappear at certain seasons. The highest and most beautiful lake in the country is that of Ochrida, which is about 20 miles long, 8 broad at the widest part, and lies 2147 feet above the sea. The lake of Scutari, in Upper Albania, is the largest. Geologically, Albania belongs to the cretaceous system of the Alps, and is composed chiefly of nummulite limestone, with here and there upheaved schist and serpentine. It possesses, in consequence of its lofty mountains and southern position, an extremely varied vegetation. Among its trees are many species of oak, the poplar, hazel, plane, chestnut, cypress, and laurel. The vine flourishes, together with the orange, almond, fig, mulberry, and citron; maize, wheat, and barley are cultivated. Its fauna comprises bears, wolves, and chamois; sheep and goats are numerous, especially the latter; the horses are excellent, and asses and mules are plentiful. Eagles and various kinds of hawks are plentiful, and hawking is a favourite amusement of the wealthy classes. Bees are reared everywhere; the cochineal insect thrives in Lower Albania; and in the marshes in the basin of the Arta and near Lake Scutari leeches are found in considerable numbers. The climate is generally speaking, excellent, though in some places low and marshy grounds give rise to fevers in the hot season. The chief exports of Albania are live-stock, wool, hides, grain, timber, oil, salt-fish, cheese, and tobacco. The chief ports are Prevesa, Avlona, and Durazzo. The population is estimated at about 1,200,000, consisting chiefly of Albanians or Arnauts (see ARNAUTS), or, as they call themselves, *Skipetars* (mountaineers), with a certain number of Greeks and Turks. They are divided into Greek Christians, Roman Catholics, and Mohammedans. Though Albania has frequently changed its name, its masters, and its boundaries, a people have been embosomed in the mountains of Albania proper from the earliest records of history, whose language and habits have retained unusual traces of nationality. The earliest geographer who mentions the Albani of this district is Ptolemy, and they appear in his time to have been a small tribe of Illyrians. In the ninth and tenth centuries Albania was included in the great Bulgarian kingdom established south of the Danube; but it was not till the year 1079 that the Albanians began to act an important part in history. From this period they exercised an important influence on the perpetual wars of their neighbours; but in 1383 they were defeated for the first time by the Turks, and again in 1478—their last struggle—when Albania became a province of the Turkish dominions, still maintaining, however, a certain degree of stubborn independence which the Porte has never found it possible to overcome.

ALBANO, a city and lake in Italy. The city of Albano is situated about 15 miles south-east of Rome, in the province of Rome, and on the west border of the Lake of Albano, amid beautiful scenery. It is well built, and being the see of a bishop contains a cathedral. Alba was part of the territory of Alba Longa, and during the latter part of the Roman Republic and under the empire it formed a favourite residence of the wealthy Romans. There are still remains of the residence of Domitian, some remarkable sepulchres, and in the neighbourhood are the villas of the Barberini and Corsini families. Pop. 6158.—The Lake of Albano, situated immediately beneath Monte Cavo (the Alban Hill), is of an oval form, 6 miles in circumference. It is surrounded by steep banks of volcanic tufa, rising in some parts to

300 or 400 feet, and has no natural outlet. Its surface is 900 feet above the level of the sea, and its depth is believed to be great. An artificial tunnel under the ridge of the western boundary, near Castel Gandolfo, 6000 feet in length, 4 feet wide, and 6½ high at the entrance, after which it rapidly narrows, carries off the superfluous waters. The time when this work was erected is not exactly known, but it is at least 2000 years old. A legend is related by Livy and Dionysius, to which credit is not usually attached, which connects it with the siege of Veii, but it was probably at least of as great antiquity as is implied in this story.

ALBANS, St. See St. Albans.

ALBANY, the original Celtic name for Scotland, latterly restricted to the mountainous region chiefly comprising the districts of Glenorchy in Argyleshire, Athol and Breadalbane in Perthshire, and part of Lochaber in Inverness-shire. It gave the title of duke formerly to a prince of the blood-royal of Scotland, and now to a member of the British royal family.

ALBANY, a city of the United States, capital of the state of New York and of the county of Albany, situated on the west bank of the Hudson, 132 miles north of the city of New York. The Hudson is navigable as far as the city, and, except when the river is obstructed by ice, steam-boats run daily between this place and the city of New York. The Erie and Champlain Canals form a junction at Watervliet, about 8 miles north of the city, and their united channel is connected at Albany with a large basin, which covers a surface of 32 acres on the west side of the river. These advantages, together with lines of railway in various directions, render Albany one of the greatest thoroughfares in the United States. The city carries on an extensive transit trade with New York, Boston, Philadelphia, and other places. It is a great mart for timber. It has foundries, breweries, tanneries, and other manufactures. Albany was settled by the Dutch in 1610–14, and is, next to Jamestown in Virginia, the oldest town in the United States. It was originally known as Beaver-Wycke or Williamstadt, but on being captured by the British in 1664 it was called Albany, in honour of the Duke of York, afterwards James II. The site on which it is built is very uneven, and it was originally laid out with little regard to elegance. The older houses are in the Dutch style, with the gable-ends to the streets; but within the present century the city has been greatly improved, and it now contains many elegant public and private buildings. There is a university, incorporated in 1852, an observatory, a state library with 90,000 volumes, and other educational institutions. The principal public edifices are the capitol or state-house, a very fine structure, the Albany Academy, a spacious and elegant edifice, the state-hall for the public offices, a state arsenal, and numerous religious edifices, the finest of which is the cathedral of the Immaculate Conception. Pop. in 1890, 94,923; in 1900, 94,151.

ALBANY, Louisa Maria Caroline, or Aloysia, Countess of, a princess of the Stolberg-Gedern family, was born in 1753, and married, in 1772, the English pretender, Charles Edward Stuart, after which event she bore the above title. Her marriage was unfruitful and unhappy. To escape from the barbarity of her husband she retired, in 1780, to a cloister, and afterwards to the house of her brother-in-law at Rome, where she met the poet Alfieri, to whom, soon after the death of her husband, she was privately married. Alfieri attributed to her his poetic inspiration. (See Alfieri.) She died at Florence, her usual place of residence, January 29, 1824, in her 72d year. Her ashes and those of Alfieri now repose under a common monument in the church of Santa Croce, at Florence, between the tombs of Machiavelli and Michael Angelo.

ALBATROSS (*Diomedea*), a genus of Natatorial Birds, having the following generic characters: a very long bill, which is sutured, robust, thick, straight, and laterally compressed, terminating in a large hook, which is apparently articulated therewith. The upper mandible is laterally grooved, and the short, tubular nostrils are situated in these grooves; the lower mandible being truncated. The toes are very long, and are webbed with an entire membrane; and the lateral toes are externally edged by a narrow membrane. There is no hinder toe; the nails are short and blunt. The tail is rounded, and composed of fourteen feathers. The wings have their second quills longest. The albatross most generally known is the *Diomedea exulans* of naturalists. It is one of the largest of marine birds, as its wings, when extended, measure from 10 to 12 feet from tip to tip. These long wings are very narrow; but the albatross being extremely strong, is able to fly with ease over a vast space. Except during high winds, when it ascends to the upper regions of the air, the albatross sails gently over the surface of the billows, rising and sinking in graceful undulation, and seizing with avidity every luckless creature that approaches the surface. It is met with at great distances from the land, settling down on the waves at night to sleep. The albatross is exceedingly voracious. Whenever food is abundant it gorges to such a degree as to become unable either to fly or swim; frequently it is seen in this state, with a fish partly swallowed and partly hanging from its mouth. The gulls then often attack and worry it until it disgorges its prey, which they are ready to seize. Fish-spawn, oceanic mollusca, and other small marine animals constitute its ordinary food. The voice of the albatross is a harsh, disagreeable cry, which has been compared to the braying of an ass. Towards the middle of June vast numbers of these birds flock towards the coast of Kamtchatka, the Sea of Okhotsk, the shores of the Kurile Islands and Behring's Straits. They arrive there extremely lean, preceding by a short time the fishes which come annually to spawn in the fresh water of the rivers. Soon after the birds become very fat from the abundance of food. They begin to retire from these coasts about the end of July, and by the 15th of August the whole have disappeared. During their sojourn the Kamtchadales catch large numbers of them by baiting hooks with fish, or by knocking them on the head when overgorged. They are not taken for their flesh, which is coarse, rank, and disgusting; but their large, hollow, wing-bones furnish the natives with various useful implements, while certain parts of their intestines are inflated and employed as floats for fishing-nets. About the middle of September they seek some lonely islet or unfrequented coast for the purpose of breeding; there they build large nests of earth, grass, &c., and lay a single egg, which is larger than those of a goose, being about 4½ inches long, generally white, except towards the larger extremity, where there are some dark spots. These eggs are edible, and it is stated by those who have used them that the white is not rendered hard by boiling. While the female sits upon the nest the male is industriously employed in supplying her with food. The common albatross is from 3 to 4 feet long, of a grayish-brown or whitish colour, with lines of black upon the back and wings. The inferior part of the body and rump are white; the end of the tail and a great part of the wings are black. The shafts of the quills are yellow. The feet, toes, and web membrane are of a reddish-brown colour; the beak is blackish. The female is similar to the male, but the young differ much from the adult. The albatross

moults twice a year without changing its colours.—Several other species have been established by naturalists, among which we may mention *D. chlororhynchos*, the Black and Yellow Beaked Albatross, of the size of a domestic goose; *D. spadicea*, the Dark Brown or Chocolate-coloured Albatross, larger than the common goose; and *D. fuliginosa*, Sooty or Quaker Albatross, smaller than the common albatross. See plate at article ORNITHOLOGY.

ALBAY, a province, town, bay, and volcano in the south-east part of the island of Luçon, one of the Philippines. The town is regularly built, with a population of 34,000; the bay capacious, secure, and almost land-locked; and the volcano, always in activity, forms a conspicuous landmark at sea.

ALBEMARLE, DUKE OF. See MONK, GEORGE.

ALBENDORF, a village in Prussia, in the province of Silesia, 50 miles south-west of Breslau. It is chiefly remarkable for the numerous pilgrimages made to its church, chapels, and statues, &c., which are so arranged as to give a representation of Jerusalem and of the chief events in our Saviour's history. The number of pilgrims amounts to 80,000–100,000 every year. Pop. 1800.

ALBERONI, GIULIO, cardinal and minister of the King of Spain, was the son of a gardener. He was born in 1664 at Firenzuola, a village of Parma, and educated for the church. His first office was that of bell-ringer in the cathedral of Piacenza. Possessed of uncommon talents he soon gained the favour of powerful patrons, especially the Duke of Vendôme, whom he accompanied to Paris and then to Spain, the duke being appointed generalissimo of the armies of Philip V. Having made himself a favourite of the Spanish king he rose to be prime minister, became a cardinal, was all-powerful in Spain after the year 1715, and endeavoured to restore it to its ancient splendour. He reformed abuses, created a naval force, organized the Spanish army on the model of the French, and rendered the Kingdom of Spain more powerful than it had been since the time of Philip II. His favourite project was the restoration to Spain of the empire ruled by Charles V. and Philip II.; and he began with Sardinia and Sicily. Even when the Duke of Orleans, regent of France, renounced the Spanish alliance to form a connection with England, the proud prelate did not alter his system; on the contrary, he threw off his mask, attacked the emperor, and took Sardinia and Sicily. After the Spanish fleet was destroyed by the English in the Mediterranean he entertained the idea of stirring up a general war in Europe, of forming an alliance for this purpose with Peter the Great and Charles XII., of involving Austria in a war with Turkey, exciting an insurrection in Hungary, and causing the Duke of Orleans to be arrested by a court faction. But the scheme was discovered. The duke, in connection with England, declared war against Spain, and explained in a manifesto the intrigues of the Italian cardinal. A French army invaded Spain, and although Alberoni endeavoured to cripple the power of France by fomenting disturbances within that kingdom, the Spanish monarch became despondent, and concluded a peace the chief condition of which was the dismissal of the cardinal. He received, December 1720, orders to quit Madrid within twenty-four hours, and the kingdom within five days. He was now exposed to the vengeance of the powers of Europe, by all of whom he was hated, and saw no country where he could abide. He did not even dare to go to Rome, because he had deceived the pope, Clement XI., in order to obtain the rank of cardinal. While crossing the Pyrenees his carriage was attacked, one of his servants killed, and he himself obliged to continue his journey on foot and in disguise. He wandered about a long time under false names. He was arrested in the territory of Genoa at the request of the pope and the King of Spain; the Genoese, however, soon dismissed him. The death of Clement put an end to this persecution, and his successor, Innocent XIII., restored him in 1723 to all the rights and honours of a cardinal. In 1740 he withdrew to Piacenza, where he passed the remainder of his life. He died at Rome in 1752, at the age of eighty-seven years. He left behind him the character of a bold and versatile intriguer rather than that of a great politician, although he certainly gave a powerful temporary impulse to the Spanish monarchy, and established many regulations which were favourable to arts, agriculture, and commerce.

ALBERT I., Margrave of Brandenburg, surnamed the *Bear*, from his heraldic emblem, was the son of Otto the Rich, count of Ballenstädt. As Marquis of Lusatia he served the Emperor Lothaire with credit in his war with Bohemia. The diet afterwards withdrew Lusatia from him, but the emperor for further services conferred on him in 1134 the Margravate of Brandenburg. In 1136–37 he made incursions into the territory of the Wends, who disturbed his government, and checked their disorders. In 1138 the Emperor Conrad conferred on him the Duchy of Saxony, of which he had deprived Henry the Proud. This led to a war with Henry, in which Albert was deprived of Brandenburg, but was restored by an armistice negotiated by the ecclesiastical electors. On the death of Henry (1139) he reassumed the title of Duke of Saxony. A combination was then formed against him, which, in spite of the favour of the emperor, reduced him to extremities. Peace was concluded in 1142. Albert resigned Saxony, and Brandenburg was raised to an immediate fief of the empire. He acquired at the same time by inheritance from Przibislas, a Vandal king who had taken his name in baptism, the country between the Elbe and the Oder. He made his new possessions a fief of the empire, and in order the better to guard them removed his residence to Brandenburg. In 1148 he led an expedition into Pomerania, and in the following year induced the duke of that country to embrace Christianity. In 1150 he was raised to the electoral dignity. In 1157 he made a third expedition against the Wends, conquered their country, and colonized it with agriculturists from Germany, Holland, and Zeeland. In 1164 he went on a crusade to the Holy Land. Another war broke out between him and Henry, duke of Saxony, which was terminated to the advantage of the latter in 1168 by the mediation of the Emperor Frederick I. In 1169 Albert remitted his estates to his son. He died in 1170. The origin of the towns of Berlin and Kölln on the Spree, of Aken on the Elbe, and other towns, is attributed to the colonies founded by him.

ALBERT I., Duke of Austria, and afterwards emperor of Germany, was born in 1248, son of Rodolph of Hapsburg, who had a short time before his death attempted to place the crown on the head of his son. But the electors, tired of his power, and emboldened by his age and infirmities, refused his request, and indefinitely postponed the election of a king of the Romans (the title of the designated successor of the emperor). After the death of Rodolph, Albert, who inherited only the military qualities of his father, saw his hereditary possessions, Austria and Styria, rise up in rebellion against him. He quelled by force this revolt, which his avarice and severity had excited; but success increased his presumption. He wished to succeed Rodolph in all his dignities, and without waiting for the decision of the diet seized the insignia of the empire. This act of violence induced the electors to choose Adolphus of

Nassau emperor. The disturbances which had broken out against him in Switzerland, and a disease which deprived him of an eye, made him more humble. He delivered up the insignia, and took the oath of allegiance to the new emperor. Adolphus, after a reign of six years, having lost the regard of all the princes of the empire, Albert was elected to succeed him. A battle ensued near Gellheim, in which Adolphus fell by the hand of his adversary. The last barrier had fallen between Albert and the supreme power, but he was conscious of having now an opportunity of displaying his magnanimity. He voluntarily resigned the crown conferred on him by the last election, and as he had anticipated was re-elected. His coronation took place at Aix-la-Chapelle in August, 1298, and he held his first diet at Nürnberg with the utmost splendour. But a new storm was gathering over him. The pope, Boniface VIII., denied the right of the electors to dispose of the imperial dignity, declaring himself the real emperor and legitimate king of the Romans. He accordingly summoned Albert before him to ask pardon and submit to such penance as he should dictate; he forbade the princes to acknowledge him, and released them from their oath of allegiance. The Archbishop of Mainz from a friend became the enemy of Albert, and joined the party of the pope. On the other hand, Albert formed an alliance with Philip le Bel of France, secured the neutrality of Saxony and Brandenburg, and by a sudden irruption into the electorate of Mainz forced the archbishop not only to renounce his alliance with the pope but to form one with him for the five ensuing years. Dismayed by this rapid success Boniface entered into negotiations with Albert, in which the latter again showed the duplicity of his character. He broke his alliance with Philip, acknowledged that the Western Empire was a grant from the popes to the emperors, that the electors derived their right of choosing from the see of Rome, and promised to defend with arms the rights of the pope, whenever he should demand it, against any one. As a reward Boniface excommunicated Philip, proclaimed him to have forfeited his crown, and gave the Kingdom of France to Albert. Philip, however, chastised the pope. Albert was engaged in unsuccessful wars with Holland, Zealand, Friesland, Hungary, Bohemia, and Thuringia. While preparing to revenge a defeat which he had suffered in Thuringia he received the news of the revolt of the Swiss, and saw himself obliged to direct his forces thither. The revolt of Unterwalden, Schwyz, and Uri had broken out January 1, 1308. Albert had not only foreseen this consequence of his oppression but desired it, in order to have a pretence for subjugating Switzerland entirely to himself. A new act of injustice, however, put an end to his ambition and life. Suabia was the inheritance of John, the son of his younger brother Rodolph. John had repeatedly asserted his right to it, but in vain. When Albert set out for Switzerland John renewed his demand, which was contemptuously rejected by Albert. John, in revenge, conspired with his governor, Walter of Eschenbach, and three friends against the life of Albert. The conspirators took advantage of the moment when the emperor, on his way to Rheinfelden, was separated from his train by the river Reuss, and assassinated him. Albert breathed his last, May 1, 1308, in the arms of a poor woman who was sitting on the road. He was a prince regardless of right and equity, tyrannical, avaricious, and ambitious, but possessed considerable abilities.

ALBERT I., Duke of Prussia, son of Frederick, margrave of Ansbach and Baireuth, and grandson of Albert Achilles, elector of Brandenburg, was born 17th May, 1490. Being designed for the church he was educated by the Archbishop of Cologne, and became a prebendary in the cathedral of that town; but he did not neglect knightly exercises, and along with his father followed the Emperor Maximilian I. on his expedition against Venice, and was present at the siege of Pavia. In 1511 he was chosen by the Teutonic knights grand-master of their order. Being the son of Sophia, sister of Sigismund, king of Poland, and descended from one of the most powerful German families, the knights hoped by his means to be freed from the feudal superiority of Poland, and placed under the protection of the empire. Being recognized by Poland he proceeded to Königsberg and assumed the government in 1512. He refused the oath of allegiance to Poland, which the previous grand-master had evaded, and prepared for resistance. In 1520, after protracted negotiations, Sigismund attempted to enforce submission by an invasion of the territories of the order, but the contest was without decisive result, and in the following year a truce of four years was agreed to at Thorn. Albert took his seat as an ecclesiastical member of the empire at the diet of Nürnberg; but soon after, adopting the principles of the Reformation, he terminated his difference with his uncle, and renouncing the ecclesiastical profession obtained his investiture in 1525 as hereditary duke of Prussia under the Polish crown. He set himself with great zeal to organize the government and promote the prosperity of his duchy, founded schools and churches, established a ducal library, and in 1543 opened the University of Königsberg. In 1527 he married first Dorothea, daughter of King Frederick of Denmark, and subsequently Anna Maria, a princess of Brunswick-Luneburg. The latter years of his reign were troubled with many intrigues, foreign and domestic; in 1532 he was put under the ban of the empire, but he succeeded in transmitting his succession to his son. (See PRUSSIA.) He died of the plague 20th March, 1568. His wife, who was attacked with the same malady, survived him only a day.

ALBERT, PRINCE, Albert-Francis-Augustus-Charles-Emmanuel, Prince of Saxe-Coburg Gotha, and Prince Consort of England, was the second son of Ernest I., duke of Saxe-Coburg, and of his first wife Louise, only daughter of the Duke of Saxe-Gotha. He was born 26th August, 1819. He received his early education at home under his father's eye, and in 1837 was sent along with his elder brother Ernest to the University of Bonn, where he devoted himself to the studies of political and natural science, history, philosophy, &c., as well as to those of music and painting. In the latter pursuits, indeed, he attained to no mean proficiency, and several of his musical compositions became favourably known to the public. Handsome and accomplished, he had made a considerable impression on his cousin Queen Victoria during a visit which he paid to England in 1836; he was present at and stayed for some time after the coronation of the queen in 1839; and on the 23d November of the same year the queen made known to the privy-council her intention of marrying the prince. The marriage was celebrated on the 10th February, 1840, and proved in every respect eminently happy. An allowance of £30,000 a year was settled upon the prince, who was naturalized by act of Parliament, received the title of Royal Highness by patent, was made a field-marshal, a Knight of the Garter, of the Bath, &c. Other honours were subsequently bestowed upon him, the chief of which was the title of Prince Consort (1857), which gave him the rank of a prince of the United Kingdom. He always carefully abstained from party politics, a course which his position rendered necessary, but which no doubt often required

much tact and prudence; but he never ceased to take a deep and active interest in the welfare and social advancement of the people in general. His services to the cause of science and art were very important; and the great exhibition of 1851 owed much of its success to his activity, knowledge, and judgment. He presided and delivered the inaugural address at the meeting of the British Association for the Advancement of Science held at Aberdeen in 1859. To the sorrow of the whole nation he died on December 14, 1861, after a short illness, at the early age of forty-two. He was buried in St. George's Chapel, Windsor, whence his remains were afterwards removed to the mausoleum built by the queen at Frogmore. A volume of addresses delivered by him on various occasions was published in 1857; and another was published in 1862, under the title of The Principal Speeches and Addresses of H.R.H. the Prince Consort. There is a Life of the Prince by Sir Theodore Martin, in five volumes, 1875–80.

ALBERTA. See Supplement.

ALBERT NYANZA, or Lake Albert, a lake of Africa, and one of the head-waters of the Nile, lying to the north-west of the Victoria Nyanza, and having a length of about 100 miles, a breadth of 20, and an area of 1800 square miles. It was formerly believed to extend much farther south, the Albert Edward Nyanza, which drains into it by the river Semliki, having been mistaken for a continuation of it. It lies about 2000 feet above sea-level, and is surrounded by precipitous cliffs. It abounds with fish, and its shores are infested with crocodiles and hippopotami. It receives the Victoria Nile, or Somerset, from the Victoria Nyanza, at its north-eastern extremity, and the White Nile issues from its northern extremity at no great distance.

ALBERTUS MAGNUS, or Albert the Great, Count of Bollstädt, Bishop of Ratisbon, a distinguished scholar of the thirteenth century. He was born in 1193, or according to some authorities in 1205, at Lauingen on the Danube in Suabia. He studied at Padua, and in 1222 became a monk of the Dominican order, teaching in the schools of Hildesheim, Ratisbon, and Cologne, where the afterwards celebrated Thomas Aquinas became his pupil. In 1245 he went to Paris, obtained the degree of magister, and publicly expounded the doctrines of Aristotle, notwithstanding the prohibition of the church. He became rector of the school of Cologne in 1249; in 1254 he was made provincial of his order in Germany; and in 1260 he received from Pope Alexander IV. the appointment of Bishop of Ratisbon. In 1263 he resigned his charge and retired to his convent at Cologne, in order to devote himself to literary and scientific pursuits, and there he composed many works, especially commentaries on the writings of Aristotle. Among the sciences studied or illustrated by him were chemistry, botany, mechanics, optics, geometry, and astronomy. He fell into dotage some time previous to his death, which took place in 1280. Albertus was probably the most learned man of his age, and of course did not escape the imputation of using magical arts and trafficking with the Evil One. He was distinguished for originality, and deserves to be gratefully remembered for his praiseworthy efforts towards the diffusion of knowledge. The scholastics who followed him as their master in opinion were called *Albertists*.

ALBI. See Alby.

ALBIGENSES, a religious sect opposed to the Church of Rome, coming first into prominence in the twelfth century, and taking its name from *Albiga*, the old form of Albi, a city of southern France, now capital of the department of Tarn. This sect was so called either because its adherents were numerous in and around Albi (the territory here being called Albigeois), or because its doctrines were condemned by a church council held there. What these doctrines were has not been precisely determined, as no formal statement of them apparently was ever drawn up. It appears, however, that the Albigenses held beliefs similar to those of the Cathari and Manicheans, the doctrines of the Cathari being traced to the Manichean sect known as Paulicians, that settled in Bulgaria, whence their tenets spread westwards to France. According to a Roman Catholic writer, 'Their teachers assumed a great simplicity of manners, dress, and mode of life; they inveighed against the vices and worldliness of the clergy; and there was sufficient truth in these censures to dispose their hearers to believe what they advanced, and reject what they decried. They taught the well-known doctrine of the Manicheans, that there are two opposing creative principles, one good, the other evil; the invisible world proceeding from the former, the body and all material things from the latter. They also rejected the Old Testament, said that infant baptism was useless, and denied marriage to the "perfect," as they called their more austere members.' (Addis and Arnold's Catholic Dictionary.) They had increased very much towards the close of the twelfth century in the south of France, about Toulouse and Albi, and in Raymond, Count of Toulouse, they found a patron and protector. As the condemnation of their doctrines by the church produced no effect, ecclesiastical officials were specially sent by the pope to endeavour to extirpate the heresy. The assassination of the papal legate and inquisitor, Peter of Castelnau, in 1208, while occupied in this mission, in the territory of Count Raymond VI. of Toulouse, led to the proclamation of a crusade against them by Pope Innocent III. An army was accordingly collected, large numbers of those composing it being mere mercenaries and adventurers, brought together by the hope of plunder rather than by zeal for the Catholic faith. The war that followed was carried on with a cruelty that reflected deep disgrace on the persecutors of these unhappy heretics, the chief leader of the papal troops being Simon de Montfort, father of the well-known Earl of Leicester. Raymond's territories were ravaged, and in 1209 the legates, Arnold, abbot of Citeaux, and Milo took Béziers, the capital of his nephew Roger, by storm, and put 20,000 of the inhabitants, without any distinction of creed, to the sword. Simon de Montfort was equally severe towards other places in the territory of Raymond and his allies, of whom Roger died in a prison and Peter I., king of Arragon, in battle. The lands taken were presented by the church, as a reward for his services, to Simon de Montfort, who, however, was killed at the siege of Toulouse in 1218. Even after the death of Raymond VI., in 1222, under excommunication, his son, Raymond VII., was obliged, notwithstanding his readiness to do penance, to defend his inheritance against the legates and Louis VIII. of France, who fell in 1226 in a campaign against the heretics. After hundreds of thousands had fallen on both sides, a peace was made in 1229, by the terms of which Raymond was obliged to purchase his absolution with a large sum of money, to cede Narbonne, with several estates, to Louis IX., and make his son-in-law, a brother of Louis, heir of his other lands. The heretics were now delivered up to the proselytizing zeal of the Dominicans, and to the courts of the Inquisition; and the Albigenses gradually disappeared.

ALBINOS, the name given to those persons from whose skin, hair, and eyes, in consequence of some defect in their organization, the dark colouring matter is absent. The skin of Albinos, therefore, whether they belong to the white, Indian, or negro races, is

of a uniform pale milky colour, their hair is white, while the iris of their eyes is pale rose colour, and the pupil intensely red, the absence of the dark pigment allowing the multitude of blood-vessels in these parts of the eye to be seen. For the same reason their eyes are not well suited to endure the bright light of day, and they see best in shade or by moonlight. The peculiarity of *albinism* or *leucopathy* is always born with the individual, and may occur among men of any colour. Nor is it confined to the human race, having been observed also in horses, rabbits, rats, mice, &c., birds (white crows or blackbirds are not particularly uncommon), fishes, and perhaps also insects. Albinism is most common among the negroes and Indians, and so frequent is it in some places, that distinct albino races were formerly thought to exist on the Isthmus of Darien and in the East Indies. Albinos are generally represented as physically and mentally weaker than other persons, but this seems not to be supported by sufficient evidence. Several albinos sometimes occur in one family; and an instance is recorded of a Welsh family in which every alternate child was an albino. Male albinos are more numerous than female ones.

ALBION, the earliest name by which the island of Great Britain was known, employed by Aristotle, and in poetry still used for Great Britain. The Greeks and Romans probably received the name from the Gauls, in whose language it would mean mountain-land or white-land, from the Celtic *alp, alb*, said to mean high or white (whence also Alps), the latter name being given to it in reference to the chalky cliffs on the coasts. Some writers would derive it from the Latin *albus*, white. It is doubtless the same word as Albany, Albainn, or Albyn.

ALBITE, or SODA-FELSPAR, a mineral consisting chiefly of silicates of aluminium and sodium, with varying quantities of ferric, calcic, and magnesic oxides. It is usually of a white colour, to which property it owes its name, but occasionally bluish, grayish, greenish, or reddish white. It has a vitreous pearly lustre, varying from transparent to opaque, an uneven and somewhat brittle fracture, and forms triclinic crystals. It acts like felspar before the blowpipe, but colours the flame yellow, is insoluble in acids, and often replaces felspar in granite, syenite, &c. It sometimes occurs in lamellar masses.

ALBOIN, King of the Lombards, succeeded his father Audoin in 561. He reigned in Noricum and Pannonia, while Cunimund, king of the Gepidæ, ruled in Dacia and Sirmia, and Baian or Chagan, king of the Avars, was completing the conquest of Moldavia and Walachia. Narses, the general of Justinian, sought his alliance, and received his aid, in the war against Totila, king of the Ostrogoths. Alboin, in connection with the Avars, made war against the Gepidæ, and slew their king Cunimund with his own hand in a great battle fought in 566. This victory established his fame. After the death of his wife Clodoswinda he married Rosamond, the daughter of Cunimund, who was among the captives. He afterwards (in 568) undertook the conquest of Italy, where Narses, who had subjected this country to Justinian, offended by an ungrateful court, sought an avenger in Alboin, and offered him his co-operation. Every year witnessed the increase of Alboin's power in Italy, in reducing which he met with no resistance, except the brave defence of single cities. Pavia fell into his hands in 572 after a siege of three years. After reigning three and a half years in Italy he was slain at Verona, in 573 or 574, by an assassin, instigated by his wife Rosamond. He had incurred her hatred by sending her, during one of his fits of intoxication, a cup, wrought from the skull of her father, filled with wine, and forcing her, according to his own words, to drink with her father. This incident has been introduced by Ruccellai and Alfieri into their tragedies, called Rosamunda, in a very pathetic manner. Gibbon details some romantic incidents in the early history of Alboin, his visit to the court of Turisund, king of the Gepidæ, whose eldest son he had slain, to receive his investiture in arms, his love for Rosamond, and his defeat by Cunimund, in an attempt to obtain her by force. Alboin, notwithstanding his occasional barbarities, was a just and beneficent ruler, and was beloved by his subjects, who owed to him much of their characteristic activity.

ALBUERA, a village in Estremadura, on the Albuera, 12 miles S.S.E. of Badajoz. A battle was fought here, May 16, 1811, between the army of Marshal Beresford, consisting of about 30,000 British, Spanish, and Portuguese, and that of the French Marshal Soult, amounting to about 25,000 men, but considerably superior in artillery. The object of the French was to raise the siege of Badajoz, which was invested by the English. Soult was obliged to retreat to Seville, with a loss stated at 8000 men. The allies lost about 7000 men, and gained the victory by a cool, well-directed, and opportune fire on the columns of French infantry. Badajoz, a few days after, fell into the hands of the allies.

ALBUFERA, a considerable salt-water lake, lying south of the city of Valencia, in Spain, near the sea, with which it communicates by a narrow channel. The French general Suchet received the title of Duke of Albufera on account of the blockade and capture of the Spanish general Blake, in Valencia. The water birds and eels which are taken here yield a large annual revenue.

ALBUM, among the Romans, a board or tablet on which official notices, such as the prætor's edicts, lists of the members of public bodies, &c., were written, and which was put up in some public place to be seen by all. It was so called either because it was of a white material (*albus*, white) or a material whitened, or because the writing on it was in white. Album is a name now generally given to a blank book for the reception of pieces of poetry, autographs, engravings, photographs, &c.

ALBUMIN, a variety of a class of substances called proteïds, which constitute a large part of the tissues of animals, of their fluids of nutrition, and in some cases are products of disease. The term albumin was formerly applied to the whole class, but it is now generally restricted to what may be regarded as types, the albumin contained in white of egg and in the serum of blood. From the former substance albumin is prepared by mixing thoroughly with water, filtering, evaporating the solution by a very gentle heat, and freeing the residue from fat, by means of ether and alcohol. By this method it retains free alkali and salts, the greater part of which can be removed by dialysis. Prepared as above described albumin is a yellowish, uncrystallizable, semi-transparent substance, which swells up and finally dissolves in water. When the solution, which must not be too dilute, is heated to about 165° Fahr., it becomes turbid, and as the temperature rises a flocky precipitate appears. This coagulation of albumin is merely a change of property without any change of composition. The coagulation is facilitated by previous careful neutralization of the alkali of the albumin with acetic acid, and can be prevented by addition of an alkali. Coagulation of albumin is effected also by strong alcohol and by acids. Blood or serum albumin differs in so few particulars that it is not easily distinguished from egg albumin. In composition they are almost identical. The average percentage composition of albumin is as follows:—

Carbon	51·5 to 54·5
Hydrogen	6·9 to 7·3
Nitrogen	15·2 to 17·0
Oxygen	20·9 to 23·5
Sulphur	0·3 to 2·0

When albumin coagulates in a fluid it very readily incloses any substances which may be suspended in it. For this reason bullock's blood has been largely employed in sugar refining to clarify the syrup. White of egg is also used for clearing turbid wine. It is coagulated by the alcohol, and then carries down with it the muddy part. From its being coagulable by various salts, and especially by corrosive sublimate, with which it forms an insoluble compound, white of egg is a convenient antidote in cases of poisoning by that substance.

ALBUQUERQUE (Portuguese, *Alboquerque*), Affonso de, Viceroy of India, surnamed the *Great* and the *Portuguese Mars*, was born at Lisbon, 1452, of a family that derived its origin from kings. An heroic and enterprising spirit at that time distinguished his nation. They had subjected to their power a large part of the western coast of Africa, and began to extend their sway over the seas and nations of India. Albuquerque was appointed viceroy of their acquisitions in this quarter, and arrived, September 26, 1503, with a fleet and some troops on the coast of Malabar. He took possession of Goa, which he made the centre of the Portuguese power and commerce in Asia; and subdued the whole of Malabar, Ceylon, the Sunda Islands, and the Peninsula of Malacca. In 1507 he made himself master of the island of Ormus, at the entrance of the Persian Gulf. When the King of Persia demanded the tribute which the princes of this island had formerly paid him, Albuquerque laid before the ambassadors a bullet and a sword, saying, 'This is the coin in which Portugal pays her tribute.' In 1511 he took Malacca, and then returned to Goa and defeated the former governor, who had taken advantage of his absence to attempt to repossess himself of it. He made the Portuguese name highly respected by all the nations and princes of India, and several, as the Kings of Siam and Pegu, courted his friendship and protection. All his enterprises were extraordinary. His discipline was strict; he was active, cautious, wise, humane, and just; respected and feared by his neighbours, beloved by his inferiors. His virtues made such an impression on the Indians that they, for a long time after his death, made pilgrimages to his tomb, and besought him to protect them against the tyranny of his successors. Notwithstanding his great merits, he did not escape the envy of the courtiers and the suspicions of King Emanuel, who sent Lopez Soarez, the personal enemy of Albuquerque, to fill his place. The ingratitude of his sovereign severely afflicted him, and he died a few days after receiving the intelligence at sea, near Goa, December 16, 1515, having recommended his only son to the king's favour, in a letter written a short time before his death. Emanuel honoured his memory by a long repentance for his ungrateful conduct, and raised his son to the highest dignities of the kingdom.

ALBURNUM, the soft white substance which, in trees, is found between the liber or inner bark and the wood, and, in progress of time acquiring solidity, becomes itself the wood. A new layer of wood or rather of alburnum is added annually to the tree in every part just under the bark.

ALBY, or Albi, a town of France, capital of the department Tarn, 42 miles N.E. of Toulouse. It stands on the left bank of the Tarn, in the centre of an extensive plain, and consists of brick houses, for the most part poorly built, in irregular, narrow, and dirty streets. The old ramparts, however, have been thrown down, and their place is now occupied by fine walks. There are also several fine avenues leading to a large central square; and an open space called the Lists of Alby, where, in the days of chivalry, knights used to assemble and hold their tourneys. The principal public building is the cathedral, a Gothic structure, begun in 1282, and like the rest of the town of brick. The manufactures are linens, cottons, leather, essence of anise, &c. Alby made a prominent figure during the religious wars, and is said to have given the Albigenses their name. Pop. (1891), 17,230; (1901), 18,262.

ALCÆUS, one of the greatest Grecian lyric poets, was born at Mitylene, in Lesbos, and flourished there at the close of the seventh and beginning of the sixth centuries B.C. Not much is known of his life. He engaged in the civil war which convulsed his country at the time of the expulsion of the tyrants, and used both the lyre and the sword in the cause of liberty. In the beginning he took part with Pittacus, but subsequently against him. Being forced to leave Mitylene he wandered about for a long time, and at last fell into the hands of Pittacus, in an attempt to force his way into his native city at the head of a body of exiles. Pittacus magnanimously restored him to liberty. A strong manly enthusiasm for freedom and justice pervades his lyrics even when he sings the pleasures of love and wine. A few fragments only are left of them, and a distant echo of his poetry reaches us in some odes of Horace. He wrote in the Æolic dialect, and was the inventor of the metre that bears his name, one of the most beautiful and melodious of all the lyric metres. Horace has employed it in many of his odes. German poets, too, have imitated it, as Klopstock. The extant fragments of his poetry have been collected by Matthiä (Leipzig, 1827) and Bergk (in his Poetæ Lyrici Græci).

ALCALA DE GUADIRA, a town of Spain, in the province of Seville, Andalusia, situated on the Guadaira, 7 miles east of Seville. It is chiefly celebrated for its manufacture of bread, with which it supplies a large part of the population of Seville. It has a castle and some Moorish remains. Pop. 9000.

ALCALA DE HENARES, a beautiful and renowned city of Spain, in New Castile, in the province of Madrid, 16 miles E.N.E. of the capital, and about 1 mile from the right bank of the Henares. It is situated near the site of the Roman town *Complutum*, and was itself formerly called by this name. The celebrated Complutensian Polyglot was printed here (1502-17) under the direction and at the expense of Cardinal Ximenes, only 600 copies being produced at a cost of over £11,000. (See Polyglot.) Three of these were on vellum, and one of them was afterwards sold for £522. The town has an imposing appearance when seen from some distance, but on nearer inspection is found to be in a state of decay. The principal edifices are the palace of the Archbishop of Toledo and the Colegio de San Ildefonso. There was formerly a university here, founded by Cardinal Ximenes, which was at one time attended by 10,000 students; but in 1836 it was removed with its library to Madrid. Alcala de Henares was the birthplace of Cervantes, the poet Figuerroa, and Antonio de Solis, historian of the conquest of Mexico. Pop. (1897), 10,543 (in 1768, 22,000).

ALCALA LA REAL, a town of Spain, in the province of Jaen, 18 miles south-west of the town of Jaen. It is situated at an elevation of 3000 feet above the level of the sea in a declivity between two hills. It was captured in 1340 by Alfonso XI. of Leon, from whence it derives the epithet Real. The town possesses a fine abbey. It has a trade in wine and wool. Pop. (1887), 15,802; (1897), 15,409.

ALCALDE (Spanish), or **ALCAIDE** (Portuguese) (from the Arabic *alqadi*, the judge), the name of a magistrate in the Spanish and Portuguese towns, to whom the administration of justice and the regulation of the police is committed. His office nearly corresponds to that of justice of the peace. The name and the office are of Moorish origin.

ALCAMO, a city of Italy, in the province of Trapani, Sicily, 6 miles south-east of Castellamare, near the site of the ancient Segesta, the ruins of which, including a well-preserved Doric temple and a theatre, as well as the remains of Moorish occupation, are still to be found here. The district is celebrated for its wine, but the town is mean. Pop. (1901), 51,809.

ALCANTARA, an ancient town and frontier fortress of Spain, in the province of Caceres, in Estremadura, on the Tagus, which is here crossed by a splendid bridge, erected by the Romans. The town was built by the Moors. One of the three ancient Spanish orders of knighthood, which derives its origin from the brethren of St. Julian del Pereiro (of the Pear-tree), in the twelfth century, and fought bravely against the Moors, received, in 1207, from the order of Calatrava, the town of Alcantara, of which it took the name, and was united with the Spanish crown, after the grand-master, Don Juan de Zuñiga, had delivered up the town to Ferdinand the Catholic in 1494. Alcantara, built on a rocky acclivity, and inclosed by ancient walls, consists, for the most part, of steep narrow streets, but has a large Gothic church, and a ruinous convent, with paintings by Morales. Pop. (1887), 3814; (1897), 3224.

ALCAZAR DE SAN JUAN, a town of Spain, in the province of Ciudad-Real (in New Castile), in a hilly district between the rivers Giguela and Zancara, on the Madrid and Alicante Railway. It has (1897) 10,675 inhabitants, is a well-built and busy place, with manufactures of soap, saltpetre, gunpowder, chocolate, and woollens.

ALCESTE, or **ALCESTIS**, the daughter of Pelias, and wife of Admetus, king of Thessaly. Her husband was ill, and, according to an oracle, would die unless some one else made a vow to meet death in his stead. This was secretly done by Alcestis. She became sick, and Admetus recovered. After her decease Hercules visited Admetus, with whom he was connected by the ties of hospitality, and promised his friend to bring back his wife from the infernal regions. He made good his word, compelling Pluto to restore Alcestis to her husband. Euripides has made this story the subject of a drama.

ALCHEMY, or **ALCHYMY**, the art which in former times occupied the place of and paved the way for the modern science of chemistry (as astrology did for astronomy), but whose aims were not scientific, being confined solely to the discovery of the means of indefinitely prolonging human life, and of transmuting the baser metals into gold and silver. Probably the ancient nations, in their first attempts to melt metals, observing that the composition of different metals produced masses of a colour unlike either—for instance, that a mixture like gold resulted from the melting together of copper and zinc—arrived at the conclusion that one metal could be changed into another. At an early period the desire of gold and silver grew strong as luxury increased, and men indulged the hope of obtaining these rarer metals from the more common. At the same time the love of life led to the idea of finding a remedy against all diseases, a means of lessening the infirmities of age, of renewing youth, and repelling death. The hope of realizing these ideas prompted the efforts of several men, who taught their doctrines through mystical images and symbols. To transmute metals they thought it necessary to find a substance which, containing the original principle of all matter, should possess the power of dissolving all into its elements. This general solvent, or *menstruum universale*, which at the same time was to possess the power of removing all the seeds of disease out of the human body and renewing life, was called the *philosopher's stone*, *lapis philosophorum*, and its pretended possessors *adepts*. The more obscure the ideas which the alchemists themselves had of the appearances occurring in their experiments, the more they endeavoured to express themselves in symbolical language. Afterwards they retained this phraseology to conceal their secrets from the uninitiated. In Egypt Hermes Trismegistus was said to have left behind him many books of chemical, magical, and alchemical learning. These, however, are of a later date. (See HERMES TRISMEGISTUS.) After him chemistry and alchemy received the name of the *hermetic art*. It is certain that the ancient Egyptians possessed considerable chemical and metallurgical knowledge, although the origin of alchemy cannot with certainty be attributed to them. Several Grecians became acquainted with the writings of the Egyptians, and initiated in their chemical knowledge. The fondness for magic, and for alchemy more particularly, spread afterwards among the Romans also. When true science was persecuted under the Roman tyrants, superstition and false philosophy flourished the more. The prodigality of the Romans excited the desire for gold, and led them to pursue the art which promised it instantaneously and abundantly. Caligula made experiments with a view of obtaining gold from orpiment. On the other hand, Diocletian ordered all books to be burned that taught to manufacture gold and silver by alchemy. At that time many books on alchemy were written, and falsely inscribed with the names of renowned men of antiquity. Thus a number of writings were ascribed to Democritus, and more to Hermes, which were written by Egyptian monks and hermits, and which, as the Tabula Smaragdina, taught in allegories, with mystical and symbolical figures, the way to discover the philosopher's stone. At a later period chemistry and alchemy were cultivated among the Arabians. In the eighth century the first chemist, commonly said to be Geber, flourished among them, in whose works rules are given for preparing quicksilver and other metals. In the middle ages the monks devoted themselves to alchemy, although they were afterwards prohibited from studying it by the popes. But there was one even among these, John XXII., who was fond of alchemy. Raymond Lully, or Lullius, was one of the most famous alchemists in the thirteenth and fourteenth centuries. A story is told of him that during his stay in London he changed for King Edward I. a mass of 50,000 lbs. of quicksilver into gold, of which the first rose-nobles were coined. The study of alchemy was prohibited at Venice in 1488. Paracelsus, who was highly celebrated about 1525, belongs to the renowned alchemists, as do Roger Bacon, Basilius Valentinus, and many others. When, however, more rational principles of chemistry and philosophy began to be diffused and to shed light on chemical phenomena, the rage for alchemy gradually decreased, though many persons, including some nobles, still remained devoted to it. Alchemy has, however, afforded some service to chemistry, and even medicine. Chemistry was first carefully studied by the alchemists, to whose labour and patience we are indebted for several useful discoveries, for example, various preparations of quicksilver, kermes, &c.

It is still impossible to assert anything with certainty about the transmutation of metals. Modern chemistry, indeed, places metals in the class of elements, and denies the possibility of changing an inferior metal into gold. Most of the accounts of such

transmutation rest on fraud or delusion, although some of them are accompanied with circumstances and testimony which render them probable. By means of the galvanic battery even the alkalies have been discovered to have a metallic base. The possibility of obtaining metal from other substances which contain the ingredients composing it, and of changing one metal into another, or rather of refining it, must therefore be left undecided. Nor are all alchemists to be considered impostors. Many have laboured, under the conviction of the possibility of obtaining their object, with indefatigable patience and purity of heart (which is earnestly recommended by sound alchemists as the principal requisite for the success of their labours). Designing men, however, have often used alchemy as a mask for their covetousness, and as a means of defrauding silly people of their money. Many persons even in our days, destitute of sound chemical knowledge, have been led by old books on alchemy, which they did not understand, into long, expensive, and fruitless labours. Hitherto chemistry has not succeeded in unfolding the principles by which metals are formed, the laws of their production, their growth and refinement, and in aiding or imitating this process of nature; consequently the labour of the alchemists is but a groping in the dark.

ALCIBIADES, son of Cleinias, an Athenian of high family, was born at Athens in B.C. 450. His father, who died a few years after his birth, had greatly distinguished himself in the Persian wars, and had taken a prominent part in the expulsion of the Peisistratidæ. Alcibiades was a relation of Pericles, who was his joint guardian along with Ariphron. He was remarkable in youth for the beauty of his person, the dissoluteness of his manners, the determination of his character, and the greatness of his abilities. He came under the influence of Socrates, who tried to lead him into the paths of virtue; but though their friendship was strengthened by mutual obligations, each having saved the other in battle, the passions of Alcibiades were too strong for advice, and little permanent effect was produced on his character. He acquired great popularity by his liberality in providing for the amusements of the people, and although guilty of many violent, extravagant, and audacious acts, he had, after the death of Cleon, a political ascendency which left him no rival but Nicias. Both at first cultivated alliance with Sparta, to which Alcibiades had a hereditary partiality, but the Spartans trusting more to Nicias, he was offended, and induced the Athenians to break with Sparta and ally themselves with Argos, Elis, and Mantineia (in the Peloponnesian war). In 419 he was chosen strategos, and led a small army into the Peloponnesus with which some important operations were effected. In 415 he advocated the Sicilian war, and was chosen one of the leaders of the expedition appointed to conduct it; but before it sailed he was charged with profaning and divulging the Eleusinian mysteries, and mutilating the busts of Hermes, which were set up in public all through Athens. He was permitted to take his place in the expedition, but recalled before his plans could be accomplished. He made his escape and went to Sparta, where he was well received. He divulged the plans of the Athenians, and assisted the Spartans to defeat them. Sentence of death and confiscation was pronounced against him at Athens, and he was cursed by the ministers of religion. He induced the Athenian dependencies of Athens to revolt, and made alliance with Tissaphernes, a Persian satrap. Soon after he abandoned Sparta and took refuge with the Persian, ingratiating himself by his affectation of Persian manners as he had previously done at Sparta by a similar affectation of Spartan simplicity. He now began to intrigue for his return to Athens, offering to bring Tissaphernes over to the Athenian alliance. His intrigue led to the establishment of an oligarchy (the Four Hundred), but they did not recall him. The fleet, however, which was stationed at Samos declared in favour of a democracy, and recalled him. The revolution was effected at Athens without the return of the armament, and the banishment of Alcibiades cancelled. He, however, remained abroad for some years in command of the Athenian forces, gained several victories, and took Chalcedon and Byzantium. In B.C. 407 he returned to Athens, where all proceedings against him were cancelled, but in 406, the fleet which he commanded having suffered a severe defeat he was deprived of his command. He retired to the Thracian Chersonesus, where he made war with mercenaries on the Thracian tribes. On the establishment of the Thirty at Athens a decree of banishment was passed against him. He took refuge with Pharnabazus, a Persian satrap, and was about to proceed to the court of Persia when he was assassinated, probably through private revenge, in B.C. 404.

ALCINOUS, said to have been a king of the Phæacians, in the island now called *Corfu*. See ULYSSES.

ALCMAN (called also ALCMÆON), the chief lyric poet of Sparta, was born in Sardis, and brought at an early age to Laconia as a slave. He was emancipated by his master in consideration of his poetic genius. He flourished between B.C. 671 and 631. Most of his poems were composed after the conclusion of the second Messenian war. He succeeded Terpander, an Æolian poet. His poems were adapted to the music of Terpander and also to that of the Phrygian and Lydian school. He accordingly adopted many forms of rhythm, of some of which he was himself the inventor. Besides love songs, his poetry embraced hymns, pæans, prosodia, and a class called parthenia, made to be sung by choruses of virgins. They composed six books, of which only some fragments remain. They were in the Doric dialect, mixed with Æolian. He was classed by the Alexandrian critics at the head of the lyric poets. The best edition is that of Welcker (Giessen, 1815).

ALCMENA. See AMPHITRYON.

ALCOBAÇA, a small town of Portugal, in Estremadura, 50 miles north of Lisbon, at the junction of the Alcoa and Baça, is celebrated for a magnificent Cistercian monastery, the richest in the kingdom. It was founded in 1148 by Don Alphonso I., and contains several royal tombs; among others, those of Dom Pedro and his ill-fated wife Inez de Castro, whose story has been sung by Camoens.

ALCOHOL, the purely spirituous or intoxicating part of all liquids that have undergone vinous fermentation extracted by distillation, is a limpid colourless liquid, of an agreeable smell, and a strong pungent taste. When brandy, whisky, and other spirituous liquors, themselves distilled from cruder materials, are again distilled, highly volatile alcohol is the first product to pass off. The alcohol thus obtained contains much extraneous matter, including a proportion of water, from the first as high as 20 or 25 per cent., and increasing greatly as the process continues. Charcoal and carbonate of soda put in the brandy or other liquor, partly retain the fusel-oil and acetic acid it contains. The product then obtained by distillation is called *rectified spirits* or *spirits of wine*, and contains from 55 to 85 per cent. of alcohol, the rest being water. By distilling rectified spirits from carbonate of potassium, powdered quicklime, or chloride of calcium, the greater part of the water is retained, and nearly pure alcohol passes over. It is only however by very prolonged digestion with

desiccating agents and subsequent distillation that the last traces of water can be removed. The specific gravity of alcohol varies with its purity, decreasing as the quantity of water it contains decreases. This property is a convenient test of the alcoholic strength of liquors that contain only alcohol and water; but on account of the condensation that invariably takes place on the mixture of these two liquids, it can be applied only in connection with special tables of reference, or by means of an instrument specially adapted for the purpose. (See ALCOHOLOMETER.) By simple distillation the specific gravity of alcohol can scarcely be reduced below ·825 at 60° Fahr.; by rectification over chloride of calcium it may be reduced to ·794; as it usually occurs it is about ·820. If spirits of wine, of specific gravity ·867, be inclosed in a bladder and exposed for some time to the atmosphere, part of the water it contains escapes through the pores of the bladder (see the article OSMOSE), and the specific gravity is reduced to ·817. Alcohol is composed of carbon, hydrogen, and oxygen, in the proportions expressed by the formula C_2H_6O. Under a barometric pressure of 29·5 inches alcohol boils at 173° Fahr. (78°·4 C.); in the exhausted receiver of an air-pump it boils at ordinary temperatures. Its congelation has only been effected recently, on being subjected to a temperature of −203° F. This low freezing-point renders it valuable for use in thermometers for very low temperatures. Alcohol is extremely inflammable, and burns with a pale-blue flame, scarcely visible in bright daylight. It occasions no carbonaceous deposit upon substances held over it, and the products of its combustion are carbonic acid and water. The steady and uniform heat which it gives during combustion makes it a valuable material for lamps. The action between alcohol and some of the metals, particularly platinum, is remarkable. When a small piece of thin platinum leaf, suspended by a wire, is heated by a spirit-lamp, and then quickly put into a glass in which there is a little alcohol, so that it shall remain just over the surface, and of course in the vapour arising from the alcohol, it continues red-hot as long as there is any alcohol in the jar. This is owing to the vapour undergoing slow combustion, and generating heat sufficient to keep the metal in a glowing state. This action affords the means of making a lamp without flame. Alcohol dissolves pure soda and potash, but it does not act upon their carbonates; consequently, if the latter be mixed with alcohol containing water, the liquor separates into two portions, the upper being alcohol deprived to a considerable extent of water, and the lower the aqueous solution of the carbonate. The alcoholic solution of caustic potassa was known in old pharmacy under the name of *Van Helmont's tincture of tartar*. Alcohol is used for purifying potash. It dissolves the greater number of the acids, and absorbs many gaseous bodies. It dissolves the vegetable acids, the volatile oils, the resins, tan, and extractive matter, and many of the soaps; the greater number of the fixed oils are taken up by it in small quantities only, but some are dissolved largely. When alcohol is submitted to distillation with certain acids a peculiar compound is formed, called *ether* (which see).

ALCOHOLOMETER, an instrument constructed on the principle of the hydrometer (which see), to determine from the specific gravity of spirituous liquors the percentage of alcohol they contain (see ALCOHOL), the scale marking directly the required proportion. If the liquor contain anything besides water and alcohol, previous distillation is necessary.

ALCOHOLS. The name alcohol is applied in modern chemistry to a large group of compounds whose chemical functions are analogous to that of common or ethylic alcohol. The alcohols may be regarded as representatives among the carbon compounds of the metallic hydrates; they may be looked on as derived from one, two, three, or more molecules of water by substitution of an alcoholic radicle for part of the hydrogen. The analogy between the alcohols and the metallic hydrates is apparent from the following formulæ:—

Hydrates.	Alcohols.
$NaHO$.	C_2H_5HO.
$Ca(HO)_2$.	$C_2H_4(HO)_2$.
$Bi(HO)_3$.	$C_3H_5(HO)_3$.
&c.	&c.

Again, the relationship between alcohols and water may be seen by inspecting these formulæ:—

Water.	Alcohol.	Water.	Alcohol.
$\left.\begin{matrix}H\\H\end{matrix}\right\}O$	$\left.\begin{matrix}C_2H_5\\H\end{matrix}\right\}O.$	$\left.\begin{matrix}H\\H\end{matrix}\right\}O$	$\left.\begin{matrix}H\\C_3H_5\\H\end{matrix}\right\}O.$
$\left.\begin{matrix}H\\H\\H\\H\end{matrix}\right\}O$	$\left.\begin{matrix}H\\C_2H_4\\H\end{matrix}\right\}O.$	$\left.\begin{matrix}H\\H\\H\\H\end{matrix}\right\}O$	

ALCORAN. See KORAN.

ALCOY, a town of Spain, in Valencia, 24 miles north by west of Alicante, near the source of the Alcoy, in a hollow encircled by hills. There is a Roman bridge over the river, and the town has a very picturesque appearance. Its chief manufacture is paper, and it is likewise famed for sugar-plums. Pop. (1887), 30,132; (1897), 31,099.

ALCUDIA, DUKE OF. See GODOY.

ALCUIN, or FLACCUS ALBINUS, an Englishman, renowned in his age for learning; the confidant, instructor, and adviser of Charlemagne. He was probably born in York in 735, and was educated under the care of Archbishop Egbert, and his successor Ælbert, with whom he went to the Continent, and who afterwards gave him the management of the school at York. Having gone to Rome to bring home the pallium (see PALLIUM) for Eanbert, the successor of Ælbert, Charlemagne became acquainted with him in Parma, on his return; invited him, in 782, to his court, and made use of his services in his endeavours to civilize his subjects. In the royal academy he was called *Flaccus Albinus*. To secure the benefit of his instructions Charlemagne established at his court a school, called *Schola Palatina*, or the Palace School, and intrusted him with the superintendence of several monasteries, in which Alcuin exerted himself to diffuse a knowledge of the sciences. Most of the schools in France were either founded or improved by him; thus he founded the school in the abbey of St. Martin of Tours, in 796, after the plan of the school in York. He himself instructed a large number of scholars in this school, who afterwards spread the light of learning through the empire of the Franks. Alcuin took his leave of the court in 801, and retired to the abbey of St. Martin of Tours, but kept up a constant correspondence with Charles to the time of his death in 804. He left, besides many theological writings, several elementary works in the branches of philosophy, rhetoric, and philology; also poems, and a large number of letters, the style of which, however, is not pleasing, and plainly betrays the uncultivated character of the age; nevertheless, he is acknowledged as the most learned and polished man of his time. He understood Latin, Greek, and Hebrew. The best edition of his works is that published at Ratisbon (1777, two vols. folio). See Lorenz's Life of Alcuin, translated into English (London, 1837).

ALCYONIUM, a genus of Cœlenterate animals, one familiar species of which, dredged around the British coasts—*A. digitatum*—is named 'Dead-Men's

Fingers', or 'Cow's Paps', from its lobed or digitate appearance. These forms each consist of a mass of little polyps, each polyp possessing eight little fringed tentacles, disposed around a central mouth. The Alcyonium forms the type of an order—the *Alcyonaria*—of the class Actinozoa (see SEA-ANEMONE); and to this order the red coral of commerce belongs. It grows on stones, shells, &c.

ALDEBARAN, or the BULL'S-EYE, in astronomy, a reddish star of the first magnitude in the southern eye of the constellation Taurus. By the spectrum analysis Aldebaran has been found to contain antimony, bismuth, iron, mercury, hydrogen, sodium, calcium, magnesium, and tellurium. Of these bismuth and tellurium are not found in the sun.

ALDEBURGH, a mun. bor. of England, on the Suffolk coast, on the Alde, long a parl. bor. with two members, birthplace of the poet Crabbe, now a seaside resort. Pop. (1901), 2405.

ALDEGONDE, PHILIPPE VAN MARNIX, Baron Mont Sainte, was born in Brussels in 1538, and studied at Geneva, where he became intimate with Calvin and an adherent of the Reformation. He drew up, in 1565, the Act of Compromise, which was signed by Count Louis of Nassau, Henry of Brederode, and others, and was directed chiefly against the introduction of the Inquisition into the Netherlands. It was rejected, however, by the regent Margaret, and in 1566 Alva arrived. St. Aldegonde fled, with the friends of the Prince of Orange, to Germany, and returned with them as their leading counsellor. In 1573 he fell into the hands of the Spaniards at Maesluys, was afterwards exchanged, and conducted many diplomatic negotiations of the young republic abroad. As Burgomaster of Antwerp he defended the town unsuccessfully against the Duke of Parma in 1584. He assisted in establishing the University of Leyden, and died there, professor of theology, in 1598.

ALDEHYDE, the oxidation product of an alcohol intermediate between it and its acid. The name, like alcohol, has been extended to denote a class of bodies. Common aldehyde (C_2H_4O) is derived from spirit of wine (ethyl alcohol) by oxidation, perhaps the readiest method being to distil the spirit with oxide of manganese and sulphuric acid. The product is made to combine with ammonia, and the purified crystalline substance is distilled from sulphuric acid and rectified. Aldehyde so prepared is a colourless, limpid, volatile, and inflammable liquid, with a peculiar ethereal odour, which is suffocating when strong. It has a specific gravity of 0·79. It oxidizes in air, especially in the presence of platinum black, and is converted into acetic acid. It rapidly decomposes oxide of silver, depositing a brilliant film of metallic silver. Advantage is taken of this reaction in silvering curved glass surfaces. Commercially aldehyde is obtained from the 'first runnings' of alcohol stills, being especially got from the alcohol manufactured from potatoes and the sugar-beet.

ALDER (*Alnus*), a genus of plants belonging to the natural order Betulaceæ, and formerly included in the same genus as the birch, but distinguished from it by having four stamens and a fruit without wings. It consists of trees and shrubs inhabiting the temperate and colder regions of the globe. The common alder (*Alnus glutinosa*) is a tree which grows in wet situations, and is distinguished by its flower-stalks being branched, its leaves being roundish, waved, serrated, and downy at the branching of the veins beneath. It is common in Europe and Asia, and the United States of America. There are few means of better employing swampy grounds than by planting them with alders; for although the growth of these trees is not rapid, their usefulness amply compensates for this. The wood of the alder, which is in great demand for machinery, is frequently wrought into cogs for mill-wheels, as it is peculiarly adapted for all kinds of work which is to be kept constantly in water. It is consequently used for pumps, sluices, pipes, drains, and conduits of different descriptions, and for the foundation of buildings situated in swamps. It is commonly used for bobbins, women's shoe-heels, clogs, and numerous articles of turnery-ware. This wood also serves for many domestic and rural uses, and makes the best charcoal for gunpowder. The roots and knots furnish a beautifully-veined wood, nearly of the colour of mahogany, and well-adapted for cabinet-work. The bark is used in the operations of tanning and leather-dressing, and by fishermen for staining their nets. This and the young twigs are sometimes employed in dyeing, and yield different shades of yellow and red. With the addition of copperas, it yields a black dye, used to a considerable extent in colouring cotton. In the Highlands of Scotland young branches of the alder, cut down in the summer, spread over the fields, and left during the winter to decay, are sometimes used as manure. The fresh-gathered leaves, being covered with a glutinous moisture, are said to be sometimes strewed upon floors to destroy fleas, which become entangled in it, as birds with bird-lime.

ALDERMAN, in the earliest English or Anglo-Saxon *Ealdorman*, from *ealdor*, older, and *man*, was the title given among the Anglo-Saxons to persons of high rank. It was synonymous with the Latin *comes*, the *jarl* of the Danes (which after the Danish times superseded it), and the *senior* and *major* of the Franks. The aldermen were at first governors of counties, and were admitted into the *witenagemot* or great council of the nation; gave their consent to the public statutes; kept order among the freeholders at the county courts; and in times of war appeared at the head of the military forces of their shires. They were at first appointed by the king, and were afterwards elected by the freeholders of the shire; at first the office was during good behaviour, but finally became hereditary. (See ANGLO-SAXONS.) Aldermen, at present, are officers associated with the mayor of a city for the administration of the municipal government, both in England and the United States. These, in England, are the modern representatives of a ruling committee of the old merchant gilds. In some places they act as judges in certain civil and criminal cases. In the city of London there are twenty-six aldermen, who preside over the twenty-six wards of the city, and from whose number the lord mayor is elected annually. There are also aldermen in connection with County Councils (see the article LOCAL GOVERNMENT).

ALDERNEY (French *Aurigny*), an island belonging to Britain, on the coast of Normandy, 10 miles due west of Cape La Hogue, and 60 from the nearest point of England, the most northerly of the Channel Islands. It is about 4 miles long and 1¼ broad, having an area of fully 3 square miles. The coast is bold and rocky, the cliffs in many places rising from 100 to 200 feet in height. In the interior the soil is fertile, producing excellent crops of corn and potatoes. About a third of the island is occupied by grass lands; and the Alderney cows are famous for the richness of their milk. The climate is mild and healthy. The town of St. Anne is situated in a beautiful valley near the centre of the island. A judge, with six 'jurats', chosen by the people for life, and twelve 'douzaniers', representatives of the people, form a kind of local legislature; but the judge and jurats alone decide upon any measure, the douzaniers having only a deliberative voice. The French language still continues to prevail among the inhabitants, but all understand and many speak English. Alder-

ney, Guernsey, Jersey, and Sark are the only parts of the possessions of William the Conqueror that now remain under the government of England. The *Race of Alderney* is a name given to the strait running between the coast of France and this island. Six miles north-west from Alderney are the Casquets, a cluster of rocks, on the largest of which is a lighthouse and a fog-bell. Pop. (1891), 1843; (1901), 2062.

ALDERSHOT, Camp at, a permanent camp for the army in England, commenced in 1854 by the purchase, on the part of government, of an extensive tract of moorland known by the name of Aldershot Heath, lying on the confines of Surrey, Hampshire, and Berkshire. The object was to accustom the officers and soldiers to act in brigades and divisions, and to familiarize them with the operations of a campaign, by accustoming them to camp life, and exercising them in all the evolutions which they might be required to perform when brought into actual contact with the enemy. The Basingstoke Canal divides the camp into a North and a South Camp (otherwise known respectively as Marlborough and Stanhope Lines). The accommodation provided for the army consisted at first of wooden huts of the simplest construction; but these have been superseded by brick buildings, and altogether the money expended upon the camp has amounted to more than £2,000,000. In 1892 it was decided to expend £1,500,000 on new buildings, including large gymnasium, hospital, and other structures. The experiment made at Aldershot has succeeded so well, as to have reduced these and similar encampments to a regular system as an institution for the training and disciplining of soldiers in the art of warfare. The men are exercised not only in military duties, but are also instructed in the camp in culinary and other duties. The number of troops, including cavalry, infantry, artillery, &c., in ordinary cases varies from 7000 to 15,000; and on the occasions of special review and manœuvres the number has reached as high as 40,000. In 1887 the queen reviewed here 60,000 men, half being volunteers. The tedium of camp life is beguiled by games, theatrical representations, reading, which is provided for by libraries and reading rooms, and other amusements provided by voluntary associations.

A town has sprung up in the neighbourhood of the camp, immediately beyond the government ground, on the edge of which the camp is established. The town of Aldershot is in Hampshire, to the south of the barracks. It contains several churches, hotels, numerous shops, and offers accommodation of various kinds, good and bad, to the soldiers: thus there are schools, newspapers, missions, literary institutes, music-halls, public-houses, &c. The pop. in 1871 was: civil, 11,615; military, 10,067; total, 21,682; in 1901, 30,974 (including military).

ALDHELM. See Adhelm.

ALDINE EDITIONS, the name given to the works which proceeded from the press of Aldus Manutius and his family at Venice. (See Manutius.) Recommended by their value, as well as by a splendid exterior, they have gained the respect of scholars and the attention of book-collectors. Many of them are the first printed editions (*editiones principes*) of Greek and Latin classics. The text of the modern classical authors printed by the Aldine family, as Petrarch, Dante, Boccaccio, and others, was critically revised from manuscripts. Generally speaking, their editions are distinguished for correctness, though their Greek classics are inferior, in this respect, to their Latin and Italian. These editions are of importance in the history of printing. Aldus deserves much credit for his beautiful types. He had nine kinds of Greek types, and no one before him printed so much and so beautifully in this language. Of the Latin character he procured fourteen kinds of type.

ALDRED, or Ealdred (also written *Alred*, *Alredus*, and *Ealredus*), an English ecclesiastic, appointed Bishop of Worcester in 1044, after having been Abbot of Tavistock. He was the first English bishop who visited Jerusalem (1058). In 1060 he was elected to the see of York, an elevation which, when he appeared at Rome, the pope refused to ratify, on account of his ignorance and simony. Aldred's solicitations, however, prevailed, and he received the pallium from the pontiff. On the death of Edward the Confessor he is said to have crowned Harold, as he afterwards did the Conqueror, whose esteem he enjoyed and whose power he made subservient to the views of the church. There runs a story to the effect that on one occasion he vehemently rebuked William for an act of injustice, and that the Conqueror knelt at the bold churchman's feet until he was appeased. He died in 1069, his death, it is said, being hastened by his grief on seeing the north of England desolated by the ravages of Harold and Canute, sons of Sweyn.

ALDRICH, Henry, Dean of Christ Church, Oxford, was born at Westminster in 1647, and was educated at Westminster School and Christ Church. He was distinguished for his scholarship, his love and knowledge of music, and his skill in architecture. He adapted many of the works of the older masters, such as Palestrina and Carissimi, to the liturgy of the Church of England, and composed besides many original services and anthems, some of which are still frequently heard in cathedrals. Among his lighter musical productions we may mention the catch, Hark, the Bonny Christ Church Bells, which has preserved its popularity till our own day. He was also author of a manual of logic, which was used as a text-book up to quite recent times. At his death, which took place in 1710, he bequeathed to the college, over which he had presided upwards of twenty years, a large and valuable musical library. He was jovial as well as scholarly, and his epigrammatic five reasons for drinking are well known.

ALDUS. See Manutius and Aldine Editions.

ALE and BEER, well known and extensively used fermented liquors, the best of which is prepared from barley, after it has undergone the process termed malting. Beer is a more general term than ale, being often used for any kind of fermented malt liquor, including porter, though it is also used in a more special signification. 'The numerous varieties of malt liquors met with in commerce may be resolved into three great classes—ale, beer, porter. *Ale*, as the term is generally understood, is a pale liquor brewed from lightly-dried malt, and abounding more or less in undecomposed saccharine matter and mucilage, and the bitter and fragrant principles of the hop; characteristics which, however, it more or less loses by maturation and age. *Beer* is a fine, strong, well-fermented liquor, darker, less saccharine, and more alcoholic than ordinary ale. *Porter* is a dark-brown coloured liquor, originally brewed from high-dried malt, but now generally made from pale malt, with a sufficient quantity of patent or roasted malt to impart the necessary colour and flavour. *Stout, brown stout*, &c., are mere varieties of porter, differing from that liquor only in their superior strength and quality. *East India ale, bitter ale*, &c., of the great brewers, are beverages which combine the pale colour and fragrant bitter of ale (the latter usually in undue excess) with the 'dryness' and maturity of beer. *Table-ale* or *table-beer* is a weak liquor, commonly containing three or four times the proportion of water usually present in ordinary beer or ale. In London porter is called beer, and indeed in all parts of the kingdom the prevailing beverage of this kind consumed by the

masses, of whatever class, commonly goes by the name of *beer*. The three great classes of malt liquor above referred to are, independent of mere differences of strength, excellence, and commercial value, practically subdivided into an almost infinite number of varieties. Every county, every town, and almost every brewer is distinguished by its production of a different-flavoured beer, readily perceived and highly appreciated by their respective votaries' (Cyclopædia of Practical Receipts). These differences depend chiefly on the quality of the materials and the varying proportions in which they are employed, the temperature of the water used for mashing, the length of time the mash is boiled, the temperature at which fermentation is effected, and the extent to which it is allowed to proceed. The colour of the beer depends on the colour of the malt and the length of time occupied by the boiling. The pale ale is made from malt dried by steam or in the sun; the deep-yellow ale, from a mixture of pale, yellow, and brown malt; and the dark-brown beer from malt that has been highly dried in the kiln and partly carbonized, mixed with the paler sorts. Beside being made from barley, maize, wheat, and other grains, beer may be manufactured from a good many other amylaceous and saccharine substances, such as beet-root, potatoes, turnips, beans, cane-syrup, molasses, &c., but the best is that made from barley-malt. Some of these substances are extensively employed in Germany, which has been celebrated as a beer-drinking country from the earliest times. Many different kinds of beer are there made, among the most important being the Bavarian summer or Lager (that is, store) beer, and winter-beer, the Bavarian Bockbier, Berlin white beer, wheat Lager beer, Broyhan beer (Hanover), Merseburg brown beer, &c. The Bavarian beer possesses excellent qualities, and is distinguished from most of the beers of Germany and other countries by the valuable property of not turning sour on exposure to the air, so that it can be preserved in half-full casks equally as well as in full ones. This quality it owes to the way in which it is fermented, this being done by the *Untergährung* process, or process of fermentation from below. The malt-wort is set to ferment in open backs with an extensive surface, and placed in cold cellars with a temperature not higher than 46½° to 50°. The operation lasts three or four weeks, and the wort, instead of showing a large head of froth, is scarcely covered with any, the yeast sinking to the bottom in the form of a viscid sediment called the *Unterhefe* or bottom-yeast. This bottom-yeast is a different substance from the precipitate which falls to the bottom of the backs in the ordinary fermentation of beer. The summer or Lager beer is brewed in the coldest months of the year, namely, December, January, and February, and is stored up in air-tight cellars. The winter-beer is intended for almost immediate consumption, and is hence called *Schenk* (that is, pot or draught) beer. It is rather weaker than the summer-beer. The Bavarian Bockbier is a double-strong beverage of the best Lager description, with a somewhat darker colour than the ordinary Lager beer and a sweeter taste. Berlin white or pale beer (Weissbier) is brewed from one part of barley-malt and five parts of wheat-malt.

The manufacture of ale or beer is of very high antiquity. Herodotus ascribes the invention of brewing to Isis, and tells us that the Egyptians drank a liquor which they called *zuthos*, fermented from barley. Ale or beer was never used to a great extent in Greece or Italy, partly owing, no doubt, to the abundance of wine in these countries. Xenophon, in his Anabasis, mentions it as being used among the inhabitants of Armenia, and the Gauls were also acquainted with it in early times. Ale or beer was in common use in Germany in the time of Tacitus. 'All the nations,' says Pliny, 'who inhabit the west of Europe, have a liquor with which they intoxicate themselves, made of corn and water (*fruge madida*). The manner of making this liquor is somewhat different in Gaul, Spain, and other countries, and it is called by many various names; but its nature and properties are everywhere the same. The people of Spain, in particular, brew this liquor so well that it will keep good for a long time. So exquisite is the ingenuity of mankind in gratifying their vicious appetites, that they have thus invented a method to make water itself intoxicate.' Our Teutonic ancestors would of course bring with them from the Continent their national beverage, and accordingly we find ale mentioned in English history in very early times. It is mentioned in the laws of Ina, king of Wessex (680), and ale-booths were regulated by law in 728. It was customary in the reigns of the Norman princes to regulate the price of ale, and a statute passed in 1272 enacted that a brewer should be allowed to sell 2 gallons of ale for a penny in cities, and 3 or 4 gallons for the same price in the country. The use of hops in the manufacture of ale and beer seems to have been a German invention, and the name beer appears to have come from Germany to England with this practice (1524), after which beer and ale were used respectively for the hopped and the unhopped liquor. In 1552 hop plantations had begun to be formed in England. Ale-houses were first licensed in 1621, and in Charles II.'s reign duties, amounting to 2*s.* 6*d.* a barrel on strong, and to 6*d.* on small ale or beer, were imposed for the first time (1660). From that time up to 1830, when it was entirely repealed, though the malt-tax remained, the duty on the barrel of strong beer varied, being in 1804 as high as 10*s.* Up to 1823 beer was classed into strong beer and small beer, the former being beer of the value of 16*s.* and upwards the barrel, the latter beer below this value. At the Union in 1707 the English duties on ale and beer were introduced into Scotland, where, besides strong and small beer, there was an intermediate species called twopenny, long a favourite beverage. Beer remained free from duty till 1880, but from 1st October in that year the duty was taken off malt and imposed on beer at the rate of 6*s.* 3*d.* (now 7*s.* 9*d.*) for every 36 gallons of worts of the specific gravity of 1057° (now 1055°), and so in proportion according to quantity and gravity. A license to be taken out annually by a brewer of beer for sale was fixed at £1; it is now £1 for the first 100 barrels, and 12*s.* for every further 50. Those intending to brew for private consumption can do so on special terms. A penalty of £100 is incurred by any one brewing beer without having a proper license, and one of £10 by any private brewer violating the regulations concerning private brewing. See also BREWING.

A-LEE, the situation of the helm when it is pushed down to the lee side of the ship, in order to put a ship about or to lay her head to the windward.

ALEMAN, MATEO, a Spanish novelist, was born about the middle of the sixteenth century at Seville. He became intendant of finance under Philip II. in 1568. Being accused of maladministration he had to undergo a long period of imprisonment, after which he went to Mexico, where he died in 1610. He wrote a poetical biography of St. Anthony of Padua (Seville, 1604), and an Ortografia Castellana (Mexico, 1608); but the work on which his fame now rests is his Vida y Hechos del Picaro Guzman de Alfarache (Life and Adventures of the Rogue Guzman de Alfarache). The first part appeared at Madrid in 1599, and its success was so great that not only were three editions soon brought out, but a

literary forger was encouraged to issue a second part at Barcelona in 1603. The genuine second part was not produced by Aleman till two years later (Valencia, 1605); a promised third part never appeared. Guzman de Alfarache is one of the best of the picaresque or rogue novels which give such a lively picture of the shady classes of society in Spain during the sixteenth and seventeenth centuries; in fact it may be said to rank second only to the Lazarillo de Tormes of Mendoza. The hero is at first tenderly reared, but being thrown out upon the world becomes in succession stable-boy, beggar, porter, thief, man of fashion, soldier, valet, pander, merchant, student, robber, galley-slave, and towards the end of this eventful career his own biographer. The work is written in the choicest Castilian, and has been translated into the principal European languages, and even into Latin.

ALEMANNI, the name of a military confederacy of several German tribes which, at the commencement of the third century after Christ, lived near the Roman territory. Their settlements extended on the east side of the Rhine, from Lake Constance, the Elbe, and the Danube, to the Main and the Lahn. Their neighbours on the east were the Suevi, and farther on the Burgundians. The principal tribes composing the Alemannic league were the Teucteri, Usipetes, Chatti, and Vangiones. Caracalla first fought with them, on the southern part of the Rhine, in 211, but did not conquer them; Severus was likewise unsuccessful. Maximin was the first who conquered and drove them beyond the Rhine, in 236–237. After his death they again invaded Gaul; but Postumus defeated them, pursued them into Germany, and fortified the boundary with ramparts and ditches, of which the mounds near Pföring on the Danube, the rampart extending through Hohenlohe to Jaxthausen, and the ditch with palisades on the north side of the Main, are remnants. (See Devil's Wall.) But the Alemanni did not desist from their incursions, and were successively repulsed by Lollianus, the successor of Postumus, by the Emperor Probus in 282, and afterwards by Constantius Chlorus. Nevertheless, during the disturbances in the empire, and until Constantine became its sole master, they occupied the tract from Mainz to Strasburg. At last Julian was sent, when Cæsar, to Gaul in 357. He again repulsed the Alemanni, and forced their princes, of whom there were then eight, to sue for peace. Their whole force, in the chief battle against Julian, amounted to 35,000 men. When the migration of the northern tribes began the Alemanni were among the hordes that overran Gaul. They spread along the whole western side of the Rhine, and in the latter half of the fifth century over all Helvetia. At last Clovis broke their power in 496, subdued them, and deprived them of a large portion of their possessions. Many of them fled to Theodoric, king of the Ostrogoths, into Italy and the Alps; the greater part, however, returned to their own country. The southern part of their territory was formed into a duchy called Alemannia; and since the time of Henry IV. the name of Swabia was applied to that part of the duchy on the east of the Rhine, and the history of the Alemanni becomes lost in that of Swabia. It is from the Alemanni that the French have derived their names for Germans and Germany in general, namely, *Allemands* and *Allemagne*, though strictly speaking only the modern Swabians and northern Swiss are the proper descendants of that ancient race.

ALEMBERT, Jean le Rond d', one of the most distinguished mathematicians and literary characters of the eighteenth century, was born in Paris in 1717, and was the natural son of the more witty than virtuous Madame de Tencin and a M. Destouches, a commissary of artillery. The infant was exposed on the steps of the Church of St. Jean le Rond soon after its birth, and appeared so weak that the police officer who found it, instead of carrying it to the foundling hospital, committed it to the care of the wife of a poor glazier. By her he was brought up, and with her he lived for more than thirty years, leaving the humble abode only when compelled by the state of his health and the strict injunctions of several physicians. His parents never publicly acknowledged him, but his father settled upon him an income of 1200 livres, a sum which was then amply sufficient to procure the necessaries of life. He showed much facility in learning, and at the age of four years was sent to a boarding-school. He was but ten years old when the principal, a man of merit, declared that he could teach him no more. He entered the College Mazarin at the age of twelve. His talents surprised his instructors, who thought they had found in him a second Pascal to support the cause of the Jansenists, with whom they were closely connected. He wrote, in the first years of his philosophical studies, a commentary on the Epistle of Paul to the Romans. But when he began to study mathematics this science captivated him so much that he renounced all theological questions. He left college, studied law, became an advocate, but did not cease to occupy himself with mathematics. A pamphlet on the motion of solid bodies in a fluid, and another on the integral calculus, which he laid before the Academy of Sciences in 1739 and 1740, showed him in so favourable a light that the Academy received him in 1741 into the number of its members. He soon after published his famous work on dynamics, Traité de Dynamique (1743), which may be said to have formed an epoch in the science; and that on fluids, Traité des Fluides. In 1746 his Mémoire sur la Cause générale des Vents obtained the prize offered by the Academy of Berlin, of which he was chosen a member. Among his communications to this academy two are highly distinguished—one on pure analysis, and another which treats of the vibrations of strings. He also took a part in the investigations which completed the discoveries of Newton respecting the motion of the heavenly bodies. Whilst Euler and Clairaut were engaged in these he delivered in 1747, to the Academy of Sciences, a solution of the problem proposed to determine what disturbances are occasioned by the mutual attraction of the planets in their elliptical revolutions round the sun, and what their motion would be if they were acted on only by the attractive power of the sun. He continued these labours for several years, and published at intervals various important astronomical treatises, including one on the precession of the equinoxes; also his experiments on the resistance of fluid bodies, and a number of dissertations on other subjects—works of the value of which there is but one opinion among scholars, but which produced a coldness on the part of Euler and others. In the first fervour of his fondness for mathematics he had for a time become indifferent to literature, but his early love of it was revived after his most important discoveries, when mathematical investigations ceased to afford him so rich a harvest of new truths, or he felt the necessity of relaxation. He entered on this new career with his Discours Préliminaire to the Encyclopédie, which will always be a pattern of style in treating of scientific subjects, uniting as it does elegance and precision. D'Alembert comprised in his Discours the essence of all his knowledge of mathematics, philosophy, and literature, acquired in a study of twenty years, and this was all that was known at that time in France on these subjects. He under-

took to prepare the mathematical part of the Encyclopédie, and wrote a great number of excellent articles. His name being prefixed to this work he shared its fate, and exposed himself to numberless quarrels. D'Alembert soon after entered the French Academy, and continued to cultivate literature together with mathematics. His literary works are distinguished by purity of language, clearness of style, and force of thought. Although he experienced much persecution on account of his connection with the Encyclopédie, and was neglected by the government of his country, he would not accept the invitations of Frederick II. to settle in Berlin, nor the offers of the Russian empress Catherine II., who desired him to take charge of the education of her son, with a pension of 100,000 livres. Though his income was always moderate his beneficence was great. His long attachment to Mdlle. de l'Espinasse shows that he was not destitute of deep and lasting affection. He died on Oct. 29th, 1783. Frederick II., who had in 1763 become personally acquainted with D'Alembert, maintained a correspondence with him, which was published after the death of both, and is very interesting. The best edition of his literary and philosophical works is that published at Paris in 1821 (five vols.), which contains also his correspondence with Voltaire and Frederick.

ALEMBIC, a simple apparatus used by the ancient chemists for distillation. The word is derived from the Arabic, but was originally the Greek *ambix*, a cup. The alembic is now superseded by the worm, still, and retort.

ALEMTEJO, or ALENTEJO (from *alem*, beyond, and *Tejo*, the Tagus), the largest but least populous province of Portugal; area, 9417 square miles. The greater part of the surface is undulating, broken up only by low hills. The principal rivers rise in Spain, as the Guadiana in the south and the Tagus in the north. The climate in the south and west is hot and dry, and the surface is largely composed of heathy plains, here and there varied by marshy tracts. Agriculture, in these localities, is little attended to, the heaths serving chiefly to feed sheep and goats. In the east the valleys are fruitful, and the hills grow fine wood. Grapes, olives, citrons, lemons, figs, and other fruits are plentiful; and the evergreen oak, cork-oak, chestnuts, pines, &c., flourish. The capital is Evora. Pop. (1900), 413,531.

ALENÇON, a town of France, capital of the department of Orne, and formerly capital of the Duchy of Alençon, on the right bank of the Sarthe, 105 miles west of Paris. The chief public buildings are the cathedral and the town-house. Alençon was long famed for the manufacture of point-lace, called 'pointe d'Alençon', but this branch of industry has much fallen off. The principal manufactures are cotton-spinning, flax-spinning, weaving of cotton, woollen, and linen fabrics, tanning, glass-making, distilling, and brewing. The fine rock-crystals, called 'diamants d'Alençon', formerly found in the neighbouring granite quarries, are now nearly exhausted. Pop. (1901), 16,590.—The counts and dukes of Alençon include many persons who have borne a prominent part in the history of France. The county was originally held by a Norman family, but it became united with the crown in 1219, and was shortly after given by Louis XI. to his fifth son, with whom the branch of the Alençon-Valois commenced. The first duke of the name lost his life at the battle of Agincourt. Another, called Charles IV., married the celebrated Margaret of Valois, sister of Francis I., and commanded the left wing of the French army at the battle of Pavia, where he was largely responsible for the defeat of his side. He is said to have died of shame; he left no issue. Catherine de Medicis for some time bore the title of Duchess of Alençon.

ALENTEJO. See ALEMTEJO.

ALEPPO (Arabic, *Haleb*, the ancient *Chalybon* or *Berœa*), a city of North Syria, capital of the vilayet of its own name, in a beautiful and fertile plain watered by the Koïk, 60 miles south-east of Iskanderoon, which is its port, and 195 miles N.N.E. of Damascus. It has a circumference of about 7 miles, consists of the old town and suburbs, and occupies several hills and their intermediate valleys. Its appearance at a distance is striking, but on entering it the streets are found to be gloomy and silent, the shops mean-looking, and the buildings in general heavy, unadorned structures. The houses, however, are substantially built of stone, and two or three stories in height. On a hill in the north-east of the city stands the citadel, a conspicuous object, surrounded by a fosse, now filled up with gardens and plantations. Previous to 1822 Aleppo contained about 100 mosques, but in that year an earthquake laid the greater part of them in ruins and destroyed nearly the whole city. The aqueduct is the oldest monument of the town, and conveys the water supply a distance of 8 miles. Among the chief attractions of Aleppo are its extensive gardens, the most celebrated production of which is the pistachio-nut. Formerly the city was the centre of a great import and export trade, and its manufactures of shawls, cottons, silks, gold and silver lace, &c., were very valuable, but the earthquake, the plague of 1827, cholera, misgovernment, and other causes have lessened its prosperity. The imports at the port of Iskanderoon or Alexandretta consist principally of European manufactured goods, petroleum, sugar, coffee, silk stuffs, indigo, metals, hardware, leather, &c., the exports being made up chiefly of wool, wheat, pistachio-nuts, gall-nuts, silk, oil-seeds, cattle, copper, hides, oranges, gums, and liquorice. The city still carries on an important caravan trade. A line branching off the Beyrout-Damascus railway has been continued to Aleppo. Aleppo, the Helbon of the Bible, was a place of great importance in very remote times; it rose rapidly after the destruction of Palmyra. From that period its prosperity continued to increase until the discovery of a passage to India by the Cape of Good Hope, when it began to decline. The population is about 127,000, of whom about a sixth are Christians.

ALESSANDRIA, a town and fortress in North Italy, capital of the province of the same name, in a marshy country, near the junction of the Bormida and the Tanaro. It was built in 1168 by the Cremonese and Milanese, and was named Alessandria in honour of Pope Alexander III., who made it a bishop's see. It has an old cathedral, and manufactures of linen, woollen, and silk goods, &c. Owing to its great strength as a fortress, and its position as the key of Piedmont, Alessandria has frequently been the object of contention. It was taken and plundered in 1522 by Duke Sforza, besieged without success by the French under Prince Conti in 1657; and taken, after an obstinate defence, by Prince Eugene in 1707. A bridge of stone connects the town and citadel. Near it is the battlefield of Marengo. Pop. (1901), 71,298.

ALEUTIAN ISLANDS, a chain of small islands belonging to the United States, separating the Sea of Kamtchatka from the northern part of the Pacific Ocean, and extending nearly 1000 miles from east to west. They form, as it were, a row of stepping-stones connecting Asia and America, with a total area of 6400 square miles, and a population of about 2000. They are of volcanic formation, and in a number of them there are volcanoes still in activity. They are

dismal, barren, and treeless; yet valleys clothed with rich herbage and capable of supporting herds of cattle throughout the year are met with, especially in Unalashka. Potatoes, turnips, and other vegetables are cultivated, and portions of the surface seem adapted for grain crops. They afford also furs and fish. The natives belong to the same stock with those of Kamtchatka; they are a harmless race of dexterous hunters and fishers. They are nominally Greek Catholics. Captain's Harbour, in Unalashka, is the most important post in the islands, and furnishes vessels with water, wood, and fresh vegetables.

ALEXANDER, universally known as THE GREAT, was the third king of Macedon bearing the name which he made so famous. He was born in Pella, B.C. 356. His mother was Olympias, an Epirote princess, who traced her descent from Achilles. There is little reason to doubt that his father was Philip of Macedon, though the latter was not confident about his paternity, and though there is no evidence of any feelings between the two such as are expected to subsist between father and son. On the contrary, Philip seems to have resented the imperial qualities of his son, which he was clever enough to see and appreciate; and Alexander showed a precocious envy of his father's neglected opportunities of conquest, a feeling which the sagacious biographer Plutarch has noted and dwelt on. No open rupture took place till Philip repudiated Olympias to wed a Macedonian lady (*Cleopatra* according to Plutarch and others, but *Eurydice* according to Arrian). During the nuptial feasting Philip made at Alexander with his sword, while the son jeered at his father's drunken fury and unsteady gait. In the assassination of Philip in 336 the repudiated and banished Olympias certainly had a hand, and we cannot be sure that Alexander was not an accomplice. But Alexander, though he had little affection for his father, had a profound sympathy with his father's leading idea—that the time had come when the City-State, so familiar to the Greeks, was to pass away and give place to the Nation, when the first European Power, in the modern sense of the word, should be evolved, and a common national ideal should be created.

B.C. 339 was the memorable year in which Alexander first appeared on the stage of universal history. At the age of sixteen the regency of Greece was intrusted to him by Philip when he set out on an expedition against Byzantium; and in that capacity it fell to his lot to lead his first army against an Illyrian rising, to found his first Alexandria in the upper valley of the Strymon, and to receive a deputation of envoys from the King of Persia—a fit beginning for the miracle of precocity, who was afterwards to destroy Thebes at twenty-one, to conquer Babylon at twenty-five, and to die master of the world at thirty-three. In the year after his appointment to the regency Alexander showed eminent military capacity at the battle of Chæronea (338), and, on the murder of Philip, ascended the throne in 336, before he had reached his twentieth year.

The brilliant natural gifts of Alexander had been developed under the tutelage of Aristotle. His personal beauty, with its ardent expressiveness and flashing eyes, was very remarkable, and he was pre-eminent in horsemanship and all athletic accomplishments. A habit (or perhaps some peculiar muscular conformation of the neck) which gave his head a tilt towards the left shoulder imparted to him an air of *hauteur*, which gave a note of eminent distinction to manners of charming grace and affability. He was of an extremely trusting disposition. Once he received a letter disclosing a conspiracy to poison him. The poison was to be administered by the court physician. Alexander handed the letter to the physician to read while he drained the contents of a cup which the latter had just presented him. His aims were uniformly high. So were his fits of passion; but he was able to control them, and whenever they broke bounds he showed every sign of penitence, remorse, and a desire to make restitution. His position in ascending the throne was a difficult one. He had enemies on every side. The Illyrians and Thracians were always watching an opportunity to attack Macedon, and indeed most of the Grecian states were ready, if possible, to throw off the Macedonian yoke. Persia regarded the growth of Macedon with suspicion; and, finally, his own Macedonian subjects were far from being united in approval of the career of conquest on which Philip and Alexander had both resolved to embark.

His reign began with an act of cruelty, such as was destined subsequently to become almost a matter of course on every change of rulers: his uncle and his half-brother were put to death, and the little daughter of Cleopatra, Philip's widow, was butchered in the arms of her mother. In the autumn of 336 Alexander marched into Greece, and was confirmed in the chief command against Persia by the Amphictyones at Thermopylæ. In 335 he advanced to the Hæmus range (the Balkans), and showed great ability in his campaign against the Thracians, crossing the Danube—apparently out of mere bravado—in the face of the enemy without losing a single man. He had no real friends among the Greek states. The Thebans, hearing a false report of his death, became overt enemies, proclaimed their independence, and slew some Macedonian officers. Alexander appeared in Bœotia with amazing despatch, and took Thebes by storm on the third day of the siege. This was the occasion on which, in the words of Milton,

> 'The great Emathian conqueror bade spare
> The house of Pindar'.

Leaving Antipater to govern in Europe, he crossed over into Asia in the spring of 334 with 30,000 foot and 5000 horse. The Persian Empire, the conquest of which he undertook, was at least fifty times as large as his own, and numbered about twenty times as many inhabitants. It extended from the Hellespont to the Punjaub, from Lake Aral to the cataracts of the Nile. But it was a vast congeries of subject provinces having no internal bond, and no principle of cohesion but the will of the king. For eighty years it had been tending to dissolution in its western provinces, which were the most exposed to danger. As stages in this process may be mentioned the revolt of Egypt under Amyrtæus in 410, and that of the Cypriote Evagoras, which was not put down till 383; the numerous revolts of satraps, of Greek cities, and of semi-Greek tyrants during the first half of the fifth century; and the attack on Persia made by Tachos, king of Egypt, in 361. It has been well remarked by Adolf Holm that the position of the Persian Empire when attacked by Alexander had some resemblance to that of the Roman Empire when overrun by the Germans. Both empires held together merely by the law of inertia; in both their strength lay not in their native elements, but in mercenaries taken from the very peoples, the Germans and the Greeks, who threatened respectively the safety of the two empires. Alexander proposed to himself nothing short of complete dispossession of Darius in favour of himself as Captain-General of Hellas, and the establishment of his own Panhellenic Empire in the room of the Persian. He was not led from point to point by this or that strategical reason. His business was not to leave Asia till every satrapy

in the Persian Empire acknowledged his sway. Even the burning of the Persian capital Persepolis was probably no act of drunken folly, as which it has often been described, but rather a signal and emphatic assertion of mastery and ownership, as of one who should say, 'the Persian Empire is mine, to throw it into the fire if I please'. Alexander had no intention of remaining King of Macedon. His design was to be the Greek Emperor of Europe and Asia; and this position in effect he assumed on the death of Darius. With this view throughout his whole career in Asia he sought as much as possible to fuse and commingle his Asiatic and European subjects, very much as England is now doing in India. This was the project to which he was giving all his efforts at the time of his death.

The first hostile army he encountered was on the river Granīcus (an affluent of the Sea of Marmora). He crossed the Granicus, just as he afterward crossed the Pinarus at Issus, in full view of the enemy, hurled himself with all his force on their centre, and completely broke it up. It was not his way to refrain from the pass in *quart* until he had first hit in *tierce*. His victories sometimes remind us of the oft-quoted *C'est magnifique mais ce n'est pas la guerre*. He won by an impetuous dash a victory which a subtler strategy might have failed to achieve, just as his sword-cut at Gordium made away with the knot which his fingers could not undo. (See GORDIUS.) The victory at Granicus was attended with unprecedented results. Sardes, Miletus, Ephesus, Halicarnassus submitted one after another, and he established in them democracies of the Greek type. In Nov. 333 Darius, eager to meet the invader, hastened to the sea-coast near Issus (at the head of the Gulf of Iskanderoon). The tactics pursued at the Granicus had here again a successful issue. Darius fled, leaving his family and his treasures in the hands of the conqueror. The mother, wife, two daughters, and son of Darius were treated with a clemency which foreshadowed the ages of chivalry. An Asiatic conqueror would have put the males to death, probably with torture, and would have sent the females to his harem. Captive Greek generals he also spared and liberated. He took possession of Damascus, a city which even then could boast of a hoary antiquity, and secured all the towns along the Mediterranean Sea. His plan now was to occupy Egypt, and this was made easy by the capture of Tyre on the 20th of August, 332, after a siege of seven months. During the siege a message came from Darius offering Alexander 10,000 talents, the hand of his daughter in marriage, and Asia as far as the Euphrates, if he would make peace. 'I would accept it if I were Alexander,' said his general, Parmenio; 'so would I,' replied Alexander, 'if I were Parmenio.' Gaza fell in Nov. 332, and Alexander, taking possession of Egypt, sacrificed to Apis and the Egyptian gods in Memphis, and held musical and athletic competitions after the Greek fashion in Tyre. Thus he conciliated the affections of his subjects. Politically he organized Egypt as a province in a way which, as Arrian remarks, foreshadowed the Roman system, giving the civil administration first to two, and then to a single governor, while the troops were placed under several separate commanders. It was now that Alexander founded the celebrated Alexandria—destined in two generations to be the first city in the Levant—and marched through the Libyan desert to consult the oracle of Jupiter Ammon, whose son he claimed to be.

Meantime Darius was collecting an army in Assyria; but before the decisive battle of Arbēla he made overtures of peace to Alexander, whose answer was, 'I, Alexander, hold all thy treasure and all thy land to be mine'—a verbal cutting of the Gordian knot. The Persian force encountered by the Greeks at Gaugamēla, near the ancient Nineveh, and about fifty miles from Arbēla (which strangely has given its name to the battle ever since), is said to have numbered 1,000,000 infantry, 40,000 cavalry, 200 scythed chariots, and 15 elephants. Alexander had only 40,000 foot and 7000 horse, but he won a decisive victory on Oct. 1, 331. The Macedonians aimed at the faces of their adversaries, as the Cæsarians afterwards did at Pharsalus. Babylon and Susa opened their gates to the conqueror, who then entered Persepolis, the capital of the province of Persis, seized its immense treasures, and burned its palace and citadel to the ground.

In the spring of 330 Alexander proceeded to Media in pursuit of Darius. That weak monarch was being carried about by Bessus, satrap of Bactria, who, on hearing of the approach of Alexander, inflicted a mortal wound on Darius and fled, leaving him to die. Darius died before Alexander came up with him (July, 330). The conqueror sent his body to Persepolis to be interred with royal honours. After taking possession of Hyrcania and Bactriana he was meditating still more gigantic plans, when he learned in the autumn of 330 that Philotas, the son of Parmenio, though cognizant of a conspiracy against his life, had not reported it. He put both Philotas and Parmenio to death. The execution of the former has been condemned, but is on the whole defensible; the murder of the latter is an inexcusable act of brutal tyranny. About the end of 330 or the beginning of 329 he crossed the great range of the Caucasus (not the modern Caucasus, but the Hindu-Kush) by a pass at an altitude of 13,200 feet—a march comparable with that of Hannibal over the Alps. He reached the city of Bactra (Balkh) and made his way north as far as the Jaxartes or Tanais, where he founded a city, probably the modern Khojend.

He remained in these regions till the summer of 327, spending the winter in Nautaca, on the right bank of the Oxus. Here occurred the murder of Clitus (see CLITUS), and Alexander's marriage with Roxana, daughter of Oxyartes, a satrap of Sogdiana. She had a son named after his father in 323. After the death of Alexander she compassed the destruction of his other wife, the daughter of Darius, and was killed with her son in 311 by Cassander. The murder of Clitus has been regarded as a great blot on the career of Alexander. But the circumstances in which he was placed greatly extenuate the act. The East believed in the divinity of Alexander, and such a belief was almost an essential condition of the permanence of his empire. When one of his own officers openly denied and ridiculed the emperor's pretensions at a state banquet he seriously imperilled the Hellenic *raj*. Alexander was like a British sea captain with a turbulent foreign crew. Such a captain would without hesitation shoot an inferior officer if he set an example of contumacy. The empire of Alexander was never subject to a second single emperor. The destinies of the West awaited the struggle between Rome and Carthage. But his vast empire nowhere save in India reverted to the pre-Alexandrine type.

Alexander now formed the idea of conquering India. He passed the Indus in 327, and formed an alliance with Taxiles, under whose guidance he reached the Hydaspes (modern Jhelum). This river he crossed after a severe struggle with Porus, in whom he met an opponent very superior to the Persian satraps who had hitherto confronted him, or rather retreated before him. He then moved farther eastward, and crossed the Acesines (Chenab) and the Hyraotes (Ravi), and reached the Hyphasis

(Beas), which now joins the last river of the Punjaub, the Sutlej, but which then flowed in a different channel. He never reached the Sutlej itself. The murmurs of his army compelled him to return. The fine instrument, which he had fashioned so dexterously, broke in his hand. He recrossed the Acesines to the Hydaspes, where he completed the cities of Nicæa and Bucephala (named after his famous horse Bucephalus), which he had already begun. He had only seen the fringe of India—the Punjaub. The wondrous country of Brahma and Buddha never felt the sway of Secundar. It was the only land which, on his departure, reverted to its condition before his arrival. He was obliged to content himself with writing his name large across the histories of Hellenic, Semitic, Egyptian, and Iranian civilization. Alexander's name does not appear in Sanscrit literature.

When he had reached the Hydaspes he built a fleet, in which he sent part of his army down the river, while the rest proceeded along the banks. The city of the Malli, where Alexander was wounded, is probably Multan; Puttala is perhaps Hyderabad. The march of 500 miles through the hideous desert of Gedrosia (Beloochistan), and the voyage of Nearchus, have given much material to romancers and rhetoricians. At Carmania he was joined by Craterus, who had marched through the Bolan Pass to Candahar, and by Nearchus, whose voyage, then thought so marvellous a feat, is no more than the short steam run from Karachi to Bunder Abbas. From Carmania he went to Pasargadæ, and thence to Susa, where he devoted himself with great energy to the task of uniting as far as possible the Macedonian and Persian nations. He himself married two Persian princesses, and he gave rewards to those of his staff who followed his example in contracting Persian alliances. He sent home to Macedonia, with a present of a talent each, about 10,000 Macedonians who by age or wounds were incapacitated for service. These veterans were led by Craterus, who was sent to succeed Antipater as governor of Europe. Antipater seems to have fallen into disfavour, though in 330 he had done service in defeating Agis, the Spartan king who threatened Megalopolis. It was of this exploit that Alexander contemptuously observed, 'So there has been a battle of the mice in Arcadia, while we have been conquering Asia'.

In 323 Alexander arrived at Babylon, where he found numberless envoys from nations near and far, come to pay their homage to the young conqueror. He was engaged in very extensive plans for the future, including the conquest of Arabia and the reorganization of the army, when he fell ill of a fever, shortly after the death of his beloved Hephæstion, which had deeply affected him. He died in May, 323, in his thirty-third year, after a reign of twelve years and eight months. The day before a rumour had gone abroad that the great general was dead, and that his friends were concealing the truth. The dying king caused his army to defile past his bed, and feebly waved them a last farewell. Alexander was a great administrator, a second Pericles in his devotion to work, an Alcibiades in his distinguished presence, a Phocion in his simplicity of character. He was, moreover, a military organizer of the first order—on the whole the most brilliant personality in Grecian history. He would never, like Mark Antony, have allowed a woman to impede him on his progress to the mastery of the world. He regarded women as 'soulless dolls', and looked on himself as possibly of divine origin, certainly of divine mission. 'It is right that Greeks should rule non-Greeks' had the assent even of his teacher Aristotle; and his strenuous acceptance of this principle is a trait which marks him as Greek in the fullest sense of the word. In fact he was the last of the 'tyrants' who were so characteristic of Grecian history. Though, like every great general, he knew how to talk to his men, never was there a great conqueror who boasted less. He was an anomaly in the fourth century before Christ. In an age of talk he did great things without talking. He designated no heir, and left his vast empire verbally *tō kratistō*. Whether he meant to the strongest, or to the worthiest, is a secret buried in the sarcophagus with which the Pellæan youth, for whom the world was all too narrow, had at last to rest contented.

The following table sums up the conclusions arrived at by Mr. Hogarth as to the chronology of Alexander's reign:—

Alexander born,	Oct., 356.
Succeeds Philip,	Sept., 336.
Wins Arbēla,	Oct. 1, 331.
Overtakes Darius,	beg. of Aug., 330.
Winters in Seistan,	Dec., 330.
Resumes advance,	spring, 329.
Reaches Candahar,	summer, ,,
Reaches Cabul,	Nov., ,,
Winters at foot of Hindu-Kush,	Dec., ,,
Crosses Hindu-Kush,	spring, 328.
Reaches Sir Daria,	June, ,,
Returns to Balkh,	Oct. or Nov., 328.
Sets out for Saravshan Valley,	Dec., 328.
Reaches Samarcand,	late in Jan., 327.
Winters at Nautaca,	Feb., ,,
Takes the field again,	April, ,,
Recrosses the Oxus,	May, ,,
Re-enters Cabul Valley,	June, ,,
Crosses the Indus,	March, 326.
Leaves Taxila,	April, ,,
Crosses the Jhelum,	midsummer, 326.
Returns to the Jhelum,	Sept., ,,
Starts with the flotilla,	Nov., ,,
Reaches the Indian Ocean,	August, 325.
Starts for Beloochistan,	early in Sept., 325.
Parts with Nearchus, who sets sail,	early in Oct., ,,
Reaches Carmania, and rejoins Nearchus,	early in 324.
Reaches Eobatana,	early autumn, 324.
Enters Babylon,	Feb. or March, 323.
Dies,	first half of June, 323.

Original authorities for the Life of Alexander are Arrian, who drew chiefly from Macedonian sources; Plutarch, who represents Greek tradition; Clitarchus, whose account is preserved in Diodorus, Curtius, and Justin; the Ephemerides Basileioi, kept by Eumenes; Nearchus, diary of his Periplus; the historical work of Chares, Alexander's chamberlain. Of modern writers the chief are Grote, vol. x.; Droysen Geschichte des Hellenismus; Adolf Holm, History of Greece, vol. iii.; Hogarth's Philip and Alexander of Macedon, London, 1897. The last two have been largely used in the above article.

ALEXANDER, the name of eight popes, the earliest of whom, Alexander I., is said to have reigned from 109 to 119. The most famous (or infamous) of the number is Alexander VI. See that article.

ALEXANDER, the name of three Scottish kings. See SCOTLAND—History.

ALEXANDER I. Emperor of Russia, son of Paul I. and Maria, daughter of Prince Eugene of Würtemberg, was born 23rd December, 1777. On the assassination of his father, 24th March, 1801, Alexander ascended the throne, and soon after a ukase was published for diminishing the taxes, liberating debtors, &c. One of the first acts of his reign was to conclude peace with Britain, against which his predecessor had declared war. In 1803 he offered his services as mediator between England and France, and two years later a convention was entered into between Russia, England, Austria, and Sweden for the purpose of resisting the encroachments of France on the territories of independent states. He was present at the battle of Austerlitz (2d December, 1805), when the combined armies of Russia and Austria were defeated by Napoleon. Alexander was compelled to retreat to his dominions at the head of the remains of his army. In the succeeding campaign the Russians were again beaten at

Eylau (8th February, 1807) and Friedland (14th June), the result of which was an interview, a few days after the battle, on a raft anchored in the Niemen, between Alexander and Napoleon, which led to the treaty signed at Tilsit, 7th July. The Russian emperor now for a time identified himself with the Napoleonic schemes. The seizure of the Danish fleet by the British brought about a declaration of war by Russia against this country and Sweden, and Alexander invaded Finland and conquered that long-coveted duchy, which was secured to him by the peace of Friedrichshamn (1809). In 1809–12 war was carried on against Turkey. The French alliance, however, he found to be too oppressive, and his having separated himself from Napoleon led to the French invasion of 1812, which, though the most important event in this reign, is not one in which Alexander was so far personally concerned as to require a detailed relation here. (See FRANCE.) In 1813 he published the famous manifesto which served as the basis of the coalition of the other European powers against France. After the capture of Paris (30th March, 1814), which was followed by the abdication of Napoleon and the restoration of the Bourbons, Alexander, in company with the King of Prussia, paid a visit to England. After the battle of Waterloo, Alexander, accompanied by the Emperor of Austria and the King of Prussia, made his second entrance into Paris, where they concluded (26th September, 1815) the treaty known as the Holy Alliance. The remaining part of his reign was chiefly taken up in measures of internal reform, including the gradual abolition of serfdom, and the promotion of education, agriculture, commerce, and manufactures, as well as literature and the fine arts. He died in the Crimea on the 1st December, 1825.

ALEXANDER II., Emperor of Russia, was born April 29, 1818, and succeeded his father Nicholas in 1855, before the end of the Crimean war. After peace was concluded the new emperor set about effecting reforms in the empire, among the first being the putting of the finances in order. The greatest of all the reforms carried out by him was the emancipation of the serfs by a decree of March 2, 1861. This measure gave freedom, on certain conditions, to 22,000,000 of human beings who were previously in a state little removed from that of slavery, being tied to the soil, and governed exclusively by the owners of the land on which they lived, having few or no civil rights. This reform was not resisted by the majority of the nobility themselves. Another reform was the inauguration of elected representative assemblies in the provinces. The Czar also did much to improve education in the empire, and introduced a reorganization of the judicial system. During his reign the Russian dominions in Central Asia were considerably extended, while to the European portion of the monarchy was added a piece of territory, south of the Caucasus, formerly belonging to Turkey in Asia. A part of Bessarabia, belonging since the Crimean war to Turkey in Europe, but previously to Russia, was also restored to the latter power. The latter additions resulted from the Russo-Turkish war of 1877–78, in which the Turks were completely defeated, the Russian troops advancing almost to the gates of Constantinople. Towards the end of the Czar's life several attempts at his assassination were made by members of the secret society known as Nihilists, and at last he was killed by an explosive missile flung at him in a street in St. Petersburg, 13th March, 1881. He was succeeded by his son, Alexander III., who died in 1894 at a comparatively early age, leaving the throne to his son, Nicholas II., the present emperor.

ALEXANDER VI. (RODRIGO LENZUOLI BORGIA), a pope notorious for his profligacy, was born at Valencia, in Spain, in 1431, and ascended the papal throne in 1492, his cardinalship dating from 1455. In his youth he was noted for dissipation, though not destitute of talent. He had five children, by a woman famous for her beauty, Rosa Vanozza. Cæsar Borgia and Lucretia are the best known. It is uncertain whether he chose the legal or the military career, but when he was only twenty-five years of age his uncle, Pope Calixtus III., decided his fate by making him a cardinal, and shortly afterwards appointing him to the dignified and lucrative office of vice-chancellor. By bribing the cardinals Sforza, Riario, and Cibo, he prepared his way to the papal throne, after the death of Innocent VIII. The long residence of the popes in Avignon, at a distance from their dominions in Italy, had diminished both their authority and revenues. To make up for this loss Alexander VI. endeavoured to impair the power of the Italian princes, and seize upon their possessions for the benefit of his own family. To effect this end he employed the most execrable means. His policy, foreign as well as domestic, was faithless and base. He alternately favoured France and Spain, both of which were eager for the possession of Naples. He understood how to extract immense sums of money from all Christian countries. To defray his immense expenses he imposed, under pretence of a crusade, oppressive taxes on all Christian states; levying in Venice alone a sum equal in weight to 799 lbs. of gold. He sold indulgences, and set aside, in favour of himself, the wills of several cardinals. His excesses roused against him the powerful eloquence of Jerome Savonarola, a Florentine Dominican, who, by pen and pulpit, urged his deposition. Finally, however, the pope's party prevailed, and Savonarola met his death at the stake in 1498. Not long after his election Alexander VI. had the honour of deciding the dispute between the kings of Portugal and Castile concerning America, when he divided their foreign possessions by a line running from pole to pole 370 miles west of the Azores. He died in 1503, not without suspicion of having unwittingly partaken, at a banquet, of poisoned wine which he had meant for one or more of his guests.

ALEXANDER, WILLIAM, Earl of Stirling, Scottish statesman and poet in the reigns of James I. and Charles I., was born at Menstrie House, Stirlingshire, in 1580, and early in life attempted to celebrate an unsuccessful passion, by composing a century of sonnets. These were published in London in 1604, under the title of Aurora, containing the First Fancies of the Author's Youth. He followed his monarch, James I., to the English court; and in 1607 published some dramas, entitled Monarchicke Tragedies, which he dedicated to the king. He had previously published a tragedy at Edinburgh, founded on the story of Darius. In 1613 he became gentleman-usher to Prince Charles, and received the honour of knighthood, his origin being merely that of an untitled landed proprietor. In 1614 he published at Edinburgh his largest work, entitled Doomsday, or the Great Day of Judgment, which has been several times reprinted. In 1621 the king made a grant to him of Nova Scotia (including part of Canada) with a view to colonization; and he was afterwards appointed lord-lieutenant of that colony, when the order of Nova Scotia baronets was instituted by Charles I. in 1625. Sir William was subsequently made secretary of state for Scotland, and created Viscount Canada and Earl of Stirling. In 1637 he published a complete edition of his poetical works, under the title of Recreations with the Muses. They are chiefly characterized by a pervading moral and religious spirit; but are pompous, heavy, and now

unreadable productions. A handsome edition, prefaced by a memoir, was published in 1870. He died in 1640.

ALEXANDER HALENSIS. See HALES (ALEXANDER DE).

ALEXANDER JAROSLAVITCH NEVSKOI, a Russian hero and saint, the son of the Grand-duke Jaroslav, was born at Vladimir, in 1219. In order to defend the empire, which was attacked on all sides, but especially by the Mongols, Jaroslav quitted Novgorod, and left the charge of the government to his sons, Fedor and Alexander, the former of whom soon afterwards died. Alexander repulsed the assailants. Russia, nevertheless, came under the Mongolian dominion in 1238. Alexander, when Prince of Novgorod, defended the western frontier against the Danes, Swedes, and knights of the Teutonic order. He gained, in 1240, a splendid victory, on the Neva, over the Swedes, and thence received his surname. He overcame, in 1243, the Livonian knights of the sword, on the ice of Lake Peipus. After the death of his father, in 1247, Alexander became Prince of Novgorod, and on the death of his brother Andreas, Grand-prince of Vladimir. He died in 1263. The gratitude of his countrymen has commemorated the hero in popular songs, and raised him to the dignity of a saint. Peter the Great honoured his memory by the erection of a splendid monastery in St. Petersburg, on the spot where Alexander gained his victory, and by establishing the order of Alexander Nevskoi.

ALEXANDER SEVERUS (in full, MARCUS AURELIUS ALEXANDER SEVERUS), a Roman emperor, was born at Ace (the modern Acre), in Phœnicia, in the year 205 A.D. He was the son of Genesius Marcianus and of Julia Mammæa, niece to the Emperor Severus. He was admirably educated by his mother, and was adopted and made Cæsar by his cousin Heliogabalus, then but a few years older than himself, at the prudent instigation of their common grandmother, Mæsa. That contemptible emperor, however, soon grew jealous of his cousin, and would have destroyed him but for the interference of the prætorian guards, who soon after put Heliogabalus himself to death, and raised Alexander to the imperial dignity in his seventeenth year, March 11th, 222. Alexander adopted the noble model of Trajan and the Antonines; and the mode in which he administered the affairs of the empire, and otherwise occupied himself in poetry, philosophy, and literature, is eloquently described by Gibbon. On the whole, he governed ably both in peace and war; but whatever he might owe to the good education given him by his mother, he allowed her a degree of influence in the government which threw a cloud over the latter part of his reign. He himself finally became convinced that in this matter he had allowed his filial reverence to mislead him, and is said to have reproached his mother with his dying breath as the cause of the disaster which had befallen them both. Alexander behaved with great magnanimity in one of the frequent insurrections of the prætorian guards; but, either from fear or necessity, he allowed many of their seditious mutinies to pass unpunished, although in one of them they murdered their prefect, the learned lawyer Ulpian, and in another compelled Dion Cassius the historian, then consul, to retire into Bithynia. At length, after having defeated, in 232, the Persians under Artaxerxes, who wished to drive the Romans from Asia, and undertaking an expedition into Gaul to repress an incursion of the Germans, he was murdered with his mother in an insurrection of his Gallic troops, headed by the brutal and gigantic Thracian, Maximin, who took advantage of their discontent at the emperor's attempts to restore discipline. This event happened in the year 235, after a reign of thirteen years. Alexander was favourable to Christianity, following the predilections of his mother, Julia Mammæa; and he is said to have placed the statue of Jesus Christ in his private temple, in company with those of Orpheus and Apollonius of Tyana.

ALEXANDRETTA, ISKENDERÛN, or SCANDEROON (the ancient *Alexandria ad Issum*), a small seaport in Syria, on the south-east coast of the Gulf of Scanderoon. It is the natural port of Aleppo and Northern Syria. The houses are mostly mean, but recently a better style has been adopted, as in the English vice-consul's residence and some granaries built by Ibrahim Pasha. The town is rendered unhealthy by the surrounding marshes, but this has been partially remedied by draining one of the largest. The port is a fine bay, running south-east from the gulf, and can shelter from thirty to thirty-five sail. The imports are chiefly grain, rice, and salt; the exports, galls, silk, cotton, and dips or beshmet (a preparation from grapes, used by the natives as food). The pop. is about 7000. See ALEPPO.

ALEXANDRIA (*Iskanderieh* of the Turks), an ancient city and seaport in Egypt, about 14 miles west of the Canopic mouth of the Nile, on the ridge of land between the sea and the bed of the old lake Mareotis. Ancient Alexandria was founded by, and named in honour of, Alexander the Great, in B.C. 332, on the site of a village called Rakôtis or Racoudah. Its founder wished to make it the centre of commerce between the east and west, and his aspirations were afterwards fully realized. The plan of the ancient city of Alexandria was sketched by the celebrated architect Dinocrates. It stood nearly on the site of the present town, though the configuration of the land has altered considerably since then, was 15 miles in circumference, and had a population of 300,000 free inhabitants, and at least an equal number of slaves. Distinguished for its magnificence, the Romans ranked it next to their own capital, and when captured by Amru, general of the Caliph Omar (A.D. 641), it contained '4000 palaces, 4000 baths, 400 theatres or places of amusement, 12,000 shops for the sale of vegetables, and 40,000 tributary Jews' (Gibbon). The city was regularly built and traversed by two principal streets, each 100 feet wide and one of them 4 miles long. It consisted of two quarters, *Rakôtis*, or the people's quarter, and *Brucheion*, or the quarter of the palace. One-fourth of the area upon which it was built was covered with temples, palaces, and public buildings, the most conspicuous being the famous lighthouse upon the little island of Pharos, which was connected with the city by a mole; the splendid temple of Jupiter Serapis; the Library, at that time the richest in the world; the Museum, a kind of academy in which learned men of every description were entertained at the expense of the state; an immense hippodrome; numerous obelisks and pillars, among which were Pompey's Pillar, or more properly, Diocletian's Pillar, and the two obelisks known as Cleopatra's Needles. Pompey's Pillar occupies an eminence 1800 feet to the south of the present walls; its total height is 98 feet 9 inches; the Needles, of red granite, and 70 feet high, stood on the edge of the eastern harbour. One having been presented to the British nation, was taken to London and set up there in 1878; the other stands now in Central Park, New York. Under the Ptolemies, as the capital of a great kingdom and the centre of the commerce of the then known world, Alexandria attained extraordinary prosperity; large merchant fleets carried on a reciprocal commerce with India and Ethiopia; and its industrial population were chiefly employed in the weaving of linen and the manufacture of glass and

papyrus. It had then, as now, two harbours, an eastern and a western, one on each side of the mole (*Heptastadium*), which connected the island of Pharos with the city. The Alexandrians were turbulent; they several times revolted under the Ptolemies and the Romans; Cæsar was obliged, in B.C. 47, to put down a terrible insurrection in this city, during which the library was consumed. Under the emperors Alexandria suffered a series of massacres, which gradually depopulated it. In 611 Chosroës II., king of Persia, seized it, but his son restored it to the emperors. In 641 Amru took it by storm, after a siege of fourteen months, and a loss of 23,000 men. The Turks captured it in 868 and 1517, and from that period it fell into decay, till its ruin was completed by the discovery of the passage to India by the Cape of Good Hope.

Modern Alexandria, which has sprung up almost entirely in the nineteenth century, stands partly on what was formerly the island of Pharos, partly on the peninsula which now connects it with the mainland and which has been formed by the accumulation of soil in the course of ages, and partly on the mainland. Much was done for the modern city by Mehemet Ali, who in particular brought the water of the Nile to it by the Mahmoudieh Canal, opened in 1820. Though the scene of much bustle and gaiety, it possesses few of the splendours of the ancient city; in common with most eastern towns, however, its meaner features are relieved by the minarets, some of which are of great beauty. The streets in the Mohammedan quarter are narrow, dirty, unpaved, and irregular; the houses, generally two or three stories high, substantial but dull, from want of windows to the street. Among the buildings belonging to this quarter are the viceregal palace of Râs-et-Tin, the governor's palace, barracks, arsenal, &c. Since 1840, when the overland route to India was established, and commercial prosperity ensued in consequence, great numbers of the old dwellings have given place to better houses. Land has greatly increased in value, and large warehouses and shops occupy the site of old Turkish houses and Arab hovels. In the foreign quarter the streets are regular and wide, built of white stone, and mostly in the Parisian style. This quarter includes the Grand Square (otherwise known as the Place Mehemet Ali), the chief place of business and resort, having a garden planted with trees and containing a fine statue of Mehemet Ali, while around it are grouped the principal shops and hotels, the English consulate and church, palatial residences of men of rank and wealth, banks, offices of companies, &c. In this quarter are three Protestant churches (one of them a Scotch church), Roman Catholic, and other churches, club-houses, hospitals, theatres, &c., as in a European town. Much damage was done here by fire and pillage, the work of the soldiery and mob, in July, 1882. It was then that the forts were bombarded and reduced to ruins by the British fleet. Among the schools are a military school, a marine school, a Lazarist college, an Italian lyceum, Protestant schools, &c. French is commonly spoken, and is used even in public notices and the names of streets. Frenchmen have been the means of providing the city with efficient water-works. These are outside the fortifications, on a height 100 feet above the sea-level. At this elevation there is a reservoir, into which the water brought by the Mahmoudieh Canal from the western branch of the Nile is pumped, so that the highest house in the city can be supplied with it. Comparatively few of the ancient landmarks of Alexandria now remain. The site of Cleopatra's palace is occupied by a railway-station for the line to Ramleh, 7 miles distant, over-looking the Bay of Aboukir, the scene of Nelson's victory over the French fleet in 1798. Here, too, are villas in the Italian style and a Roman Catholic church. Another passenger station, built for the Cairo, Rosetta, and Suez Railway, is situated beside the gate of Moharrem Bey. A little to the south of the city are the catacombs, consisting of a number of passages and chambers excavated in the calcareous rock. They now serve as a quarry. Alexandria has two ports, the new (anciently the Great Port), on the east; and the old port (anciently *Eunostos*) on the west. The new is not much used, having a foul and rocky bottom, besides being exposed to the north winds. The old port is the principal, and has been so much improved and extended in recent times as to be really the new port. In particular a long breakwater has been constructed, starting from what was the Isle of Pharos, and running in a south-western direction; this, along with a breakwater built out from the opposite shore, encloses a very large sheltered area. A new pass or entrance 35 ft. deep has also been provided. An inner harbour is formed by a mole 900 yards in length. Round this harbour fine quays have been constructed, with suitable railway and other accommodation. The trade is very large, the imports being about £20,000,000 annually, the exports considerably more. The principal articles of export are cotton, cotton-seed, beans, cigarettes, wheat, maize, barley, gums, onions, tomatoes, hides, lentils, wool, sesamum, senna, ostrich feathers, &c. The chief imports from Great Britain are cotton manufactures and yarn, woollen manufactures, coals, iron goods, earthenware, hardwares, drugs, machines, liquors, &c. It was supposed by many that the opening of the Suez Canal and the establishment of a rival port (Port Saïd) would seriously affect the prosperity of Alexandria, a supposition which has happily been falsified. The port has almost monopolized the Egyptian cotton trade, which has been so extensively developed since the American civil war. The population is mixed, and the foreigners are very numerous. Little social intercourse takes place between the natives and the Franks, owing to the irreconcilable nature of the peculiar habits and customs of each. During the insurrection of 1882, headed by Arabi Pasha, Alexandria was the scene of great tumult and frequent riots, in which many resident Europeans were massacred. The British intervened to restore order, and in consequence of the continued active opposition of the insurgents, the forts were bombarded by their fleet, as already mentioned, on the 11th July. Two days later, when the British entered the city, they found the finest parts of it sacked and in flames. An official statement gave the population for 1872 at 212,034; by the census of 1907 it was 332,246.

ALEXANDRIA, a town and port of Virginia, on the Potomac, 7 miles south of Washington. It is built with great regularity, in straight and spacious streets, which cross each other at right angles. The place is favourably situated for commerce, and carries on a considerable trade, chiefly in flour. There is sufficient depth of water for the largest ships. Pop. (1880), 13,659; (1890), 14,339; (1900), 14,528.

ALEXANDRIA, a town in Scotland, in Dumbartonshire, pleasantly situated on the west bank of the Leven, 3 miles north of Dumbarton. It is connected with Glasgow by rail, and has extensive cotton-printing and bleaching works, in which the inhabitants are chiefly employed. Pop. (1891), 7796; (1901), 8007.

ALEXANDRIAN LIBRARY, the largest and most famous of all the ancient collections of books, and the glory of Alexandria. It was founded by Ptolemy Soter (died 283 B.C.), king of Egypt, and

was greatly enlarged by the care of his son Philadelphus and the succeeding Ptolemies. Demetrius Phalereus, after his banishment from Athens, is said to have been its first superintendent, when the number of volumes or rolls amounted to 50,000. If the other Ptolemies were as unscrupulous in their methods of obtaining books as Euergetes is said to have been, it is no wonder that the library rapidly increased in magnitude and value. We are told that he refused to sell corn to the Athenians during a famine unless he received in pledge the original manuscripts of Æschylus, Sophocles, and Euripides. These were carefully copied, and the copies returned to the owners, while the king retained the originals. Various accounts are given of the number of books contained in the library at its most flourishing period, when Zenodotus, Callimachus the poet, Eratosthenes of Cyrene, and Apollonius Rhodius were its librarians. Seneca states the number at 400,000; Aulus Gellius makes it 700,000. Some reconcile the discrepancy by making the statements refer to different periods, while others believe that the larger figure includes more than one collection. That there were more than one collection is well known. The original or Alexandrian library par excellence was situated in the Brucheion, a quarter of the city in which the royal palace stood; and besides this there was a large collection in the Serapeion, or temple of Jupiter Serapis. But when or by whom the latter was founded we do not know. The former was burned during Julius Cæsar's siege of the city, but was replaced by the library of Pergamus, which was sent by Antony to Alexandria as a present to Cleopatra. The Serapeion library, which probably included the Pergamean collection, existed to the time of the Emperor Theodosius the Great. At the general destruction of the heathen temples, which took place under this emperor, the splendid temple of Jupiter Serapis was set upon and gutted (A.D. 391) by a fanatical crowd of Christians at the instigation of the Archbishop Theophilus, when its literary treasures were destroyed or scattered. The historian Orosius relates that in the beginning of the fifth century only the empty shelves were to be seen. A library was again accumulated in Alexandria, but was doomed to suffer the same fate, being burned by the Arabs when they captured the city under the caliph Omar in 641. Amru, the captain of the caliph's army, would have been willing to spare the library, but the fanatical Omar disposed of the matter in the famous words—'If these writings of the Greeks agree with the Koran they are useless, and need not be preserved; if they disagree they are pernicious, and ought to be destroyed.' The story that the Arabs still found enough books to heat the baths of the city for six months must, however, be a gross exaggeration; indeed many authorities throw great doubts on the existence of a library of any importance at this epoch, and treat the story of its destruction by the Arabs as a fiction. In connection with the original library was the Museum, a literary institution in which learned men were maintained at the public expense, in order that they might devote themselves exclusively to study.—See Gibbon's Decline and Fall; Edwards, Memoirs of Libraries; Ritschl, Die Alexandrinischen Bibliotheken (Berlin, 1838).

ALEXANDRIAN SCHOOL. When the flourishing period of Greek poetry was past, study was called in to supply what nature no longer furnished. Alexandria in Egypt was made the seat of learning by the Ptolemies, admirers of the arts, from whence this age of literature took the name of the Alexandrian. Ptolemy Philadelphus founded the famous library of Alexandria, the largest and most valuable one of antiquity, which attracted many scholars from all countries; and also the Museum, which may justly be considered the first academy of sciences and arts. (See last article.) The grammarians and poets are the most important among the scholars of Alexandria. These grammarians were philologists and literati, who explained things as well as words, and may be considered a kind of encyclopedists. Such were Zenodotus the Ephesian, who established the first grammar-school in Alexandria, Eratosthenes of Cyrene, Aristophanes of Byzantium, Aristarchus of Samothrace, Crates of Mallus, Dionysius the Thracian, Apollonius the sophist, and Zoilus. Their merit is to have collected, examined, reviewed, and preserved the existing monuments of intellectual culture. To the poets belong Apollonius the Rhodian, Lycophron, Aratus, Nicander, Euphorion, Callimachus, Theocritus, Philetas, Phanocles, Timon the Phliasian, Scymnus, Dionysius, and seven tragic poets, who were called the *Alexandrian Pleiads*. The Alexandrian age of literature differed entirely in spirit and character from the preceding. Great attention was paid to the study of language; correctness, purity, and elegance were cultivated; and several writers of this period excel in these respects. But art could not replace genius, and the greater number of the Alexandrians, commonly grammarians and poets at the same time, are stiff and laborious versifiers, without genius.—Besides the Alexandrian school of poetry, one of philosophy is also spoken of, but the expression is not to be understood too strictly. Their distinguishing character arises from this circumstance, that in Alexandria the Eastern and Western philosophy met, and an effort took place to unite the two systems, for which reason the Alexandrian philosophers have often been called *Eclectics*. This name, however, is not applicable to all. The New Platonists form a distinguished series of philosophers, who, renouncing the scepticism of the new Academy, endeavoured to reconcile the philosophy of Plato with that of the East. The Jew Philo of Alexandria (see PHILO JUDÆUS) belongs to the earlier New Platonists. Plato and Aristotle were diligently interpreted and compared in the first and second centuries after Christ. Ammonius the Peripatetic, the teacher of Plutarch, belongs to this period. But the real New Platonic school of Alexandria was established at the close of the second century after Christ by Ammonius of Alexandria (about 193 A.D.), whose disciples were Plotinus and Origen. (See NEW PLATONISTS.) Being for the most part orientals, formed by the study of Greek learning, their writings are strikingly characterized—for example, those of Ammonius Saccas, Plotinus, Iamblicus, Porphyrius—by a strange mixture of Asiatic and European elements, which had become amalgamated in Alexandria owing to the mingling of the Eastern and Western races in its population, as well as to its situation and commercial intercourse. Their philosophy had a great influence on the manner in which Christianity was received and taught in Egypt. The principal Gnostic systems had their origin in Alexandria. (See GNOSTICS.) The principal teachers of the Christian catechetical schools, which had risen and flourished together with the eclectic philosophy, had imbibed the spirit of this philosophy. The most violent religious controversies disturbed the Alexandrian church, until the orthodox tenets were established in it by Athanasius in the controversy with the Arians. —Among the scholars of Alexandria are to be found great mathematicians, as Euclid, the father of scientific geometry; Apollonius of Perga in Pamphylia, whose work on conic sections still exists; Nicomachus, the first scientific arithmetician: astronomers, who fixed the images and names (still in use) of the

constellations, who left astronomical writings (for example, the Phænomena of Aratus, a didactic poem, the Sphærica of Menelaus, the astronomical works of Eratosthenes, and especially the Magna Syntaxis of the geographer Ptolemy), and made improvements in the theory of the calendar, which were afterwards adopted into the Julian calendar: teachers and practitioners of medicine, and others. All these belonged to the numerous association of scholars continuing under the Roman dominion and favoured by the Roman emperors, which rendered Alexandria one of the most renowned and influential seats of science in antiquity.—See Matter's Histoire de l'École d'Alexandrie (Paris, 1840–44); Barthélemy Saint-Hilaire, De l'École d'Alexandrie (Paris, 1845); Simon, Histoire de l'École d'Alexandrie (Paris, 1844–45); Charles Kingsley, Alexandria and Her Schools (Cambridge, 1854).

ALEXANDRIAN VERSION, or Codex Alexandrinus (Codex A.), a Greek manuscript of the Bible, now in the British Museum, of great importance in biblical criticism. It is on parchment, with uncial letters, without breathings and accents or spaces between the words. It was written probably in the middle of the fifth century, and contains, in four vols. small folio, the whole Greek Bible (the Old Testament according to the Septuagint), together with two letters of Bishop Clement of Rome to the Corinthians, and eight psalms of Solomon, so called. The three first volumes contain the translation of the Old Testament; the fourth, the New Testament. A large part of the Gospel of St. Matthew and of the Second Epistle to the Corinthians, as well as a portion of the Gospel of St. John, are wanting. The patriarch of Constantinople, Cyrillus Lucaris, who in 1628 sent this manuscript as a present to Charles I., said he had received it from Egypt; and it is evident from other circumstances that it was written there. But it cannot be decided with certainty whether it came from Alexandria (whence its name). It is said, however, to have belonged to the patriarch of Alexandria at the end of the eleventh century. John Ernest Grabe followed it in his edition of the Septuagint (Oxford, 1707–20, folio, four vols.). Dr. Woide published the New Testament (London, folio, 1786), with types cast for the purpose, page for page and line for line, as in the manuscript itself. A somewhat more accurate text of the New Testament in ordinary Greek type (with the lacunæ supplied) was published by R. H. Cowper in 1860. Henry Hervey Baber edited a facsimile edition of the Old Testament (London, 1816–28, three vols. folio). In 1864 the complete text, along with three other of the oldest texts of the Bible, was published at Oxford, the work being arranged in parallel columns. An autotype facsimile of the whole codex in four volumes was published by the British Museum in 1879–83. The text of this manuscript is of most importance in the criticism of the Epistles of the New Testament; in the Gospels the text is not so good.

ALEXANDRINE, the name of a verse, which consists of six feet (or of six and a half with female rhymes), equal to twelve syllables, the pause being in correct Alexandrines always on the sixth syllable; for example, the second of the following verses (from Pope's Essay on Criticism):—

> A needless Alexandrine ends the song,
> That, like a wounded snake, drags its slow length along.

The only complete English poem of literary importance written in this measure is Drayton's Polyolbion. The concluding line of the Spenserian stanza is an Alexandrine. The French in their epics and dramas are confined to this verse, which for this reason is called by them the *heroic*. The Alexandrine derives its name from an old French poem belonging to the middle of the twelfth or the beginning of the thirteenth century, the subject of which is Alexander the Great, and in which this verse was first made use of.

ALEXANDROPOL (formerly *Gumri*), a Russian town and fortress in the Transcaucasian government of Erivan, situated on a bare plateau near the highway from Erivan to Kars. There is accommodation in the military quarters for a force of 10,000 men. The town has several churches and caravanserais, and there are extensive silk manufactories. Pop. (1897), 30,735.

ALEXANDROV, a town of Russia, in the government of Vladimir, about 60 miles north-east of Moscow. Pop. about 6000.

ALEXIS, a Greek comic poet, a native of Thurii in Magna Græcia, afterwards an Athenian citizen, was born about 394 B.C., and is known to have lived as late at least as 288 B.C. He was the uncle and instructor of Menander, and is said to have written 245 plays, characterized by wit and elegance. Only a few fragments of his works remain, which may be found in collections of the ancient Greek poets.

ALEXIS MIKHAILOVITCH, second Russian czar of the line of Romanof. See Russia.

ALEXIS PETROVITCH, the eldest son of the czar Peter the Great and Eudoxia Lapuchin, was born in Moscow, 1690, and opposed the innovations introduced by his father, who, on this account, determined to disinherit him. Alexis renounced the crown, and when Peter set out on his second journey he made his escape in 1717 to Vienna, where he sought the protection of his brother-in-law the German emperor, and thence to Naples, under the pretext of going to his father, who had sent for him. At the command of Peter he returned; but the enraged czar, regarding his flight as an act of treason, disinherited him by a ukase of 2nd February, 1718; and when he discovered that Alexis was paving the way to succeed to the crown he not only caused all the participators in his project to be punished capitally or otherwise, but had his son also condemned to death, and the sentence read to him, as pronounced unanimously by 144 judges. Although he was soon afterwards pardoned, yet the fright and anxiety which he had experienced affected him so much that he died in the course of four days, 7th July, 1718. It is supposed by some that he was poisoned. He left a daughter and a son, afterwards the emperor Peter II.

ALEXIUS, or Alexis, I. (Comnenus), Emperor of Constantinople, was born in 1048, and died August 15, 1118. He was the third son of John Comnenus, the emperor Isaac's brother. Naturally clever, he was carefully educated under the direction of his mother; and at the age of fourteen took part in an engagement with some European adventurers commanded by a Scot called Russel de Balliol, of whom the youthful warrior afterwards became an intimate friend. After several successive emperors had tasted for a brief season the 'bitter sweets' of a nominal supremacy over a country torn by anarchy, in 1077 Nicephorus Botoniates was elevated to the Byzantine throne. Alexis drew upon himself the jealousy of this ruler by a victory which he gained over Nicephorus Briennius, who aspired to the throne, and after which his soldiers saluted him as *Sebastos* (Augustus). With the aid of the army he was proclaimed emperor, seized on Constantinople, which he permitted his soldiers to pillage, and shut up Botoniates in a monastery (1081). The empire was then in a deplorable state. The Turks were profiting by these intestine dissensions to seize upon the Asiatic provinces, while Robert Guiscard and his Normans were menacing the west, and fierce swarms from beyond the

Danube threatened the nearer provinces. However, Alexis did not despair; he sent supplies of money to his ally Henry IV. of Germany to enable him to attack Rome, the pope (Gregory VII.) being a firm friend of the Norman leader. His holiness had to flee, and Guiscard hastened to his aid, leaving in Greece his son Bohemond, who gained two victories over Alexis; but famine and disease weakened the Norman army, which Robert could not rejoin, as he was detained in Italy by a revolt of his vassals. In 1084 he returned to the charge, and after gaining some advantages he suddenly died of an epidemic; although some ascribe his death to poison administered by one of Alexis' secret agents. In consequence of this event the Normans abandoned all their conquests, and Alexis turned his attention to the Turks and Scythians, whom, after an arduous struggle, he completely defeated. Scarcely was this accomplished when, in 1096, the bands of the first Crusade arrived at Constantinople demanding aid, rudely menacing him in his own palace, and finally compelling him to join them. Alexis, notwithstanding his inventive genius, was now almost at his wits' end. The alliance did not last long; a war broke out between the emperor and the Crusaders, which ended in the defeat of the latter, and Bohemond's heirs did homage to Alexis for the principality of Antioch. The rest of Alexis' life was employed in consolidating his conquests and restoring orderly government in his states, which were much disturbed by heresies. He died at the age of seventy, after a reign of thirty-seven years. He extended his empire; and for its defence he left to his successors a well-disciplined army, which he had wholly created himself. Historians differ respecting his conduct and abilities; his daughter Anna wrote a life of him (the Alexiad), which is one continuous eulogy.

ALFARABI, an eminent Arabian philosopher of the tenth century, was a native of Farab, in Asia Minor, his proper name being Abu Nasr Mohammed ben Mohammed ben Tarkhan; died at Damascus in 950. His works consist of treatises on different parts of the Aristotelian philosophy. He excelled in music and philology, as well as in philosophy; and one of his most famous works is a kind of encyclopædia, in which he gives a brief account and definition of all branches of science and art. The MS. of this is in the Escurial. His works were printed at Paris in 1638.

ALFIERI, Vittorio, Count, was born at Asti, in Piedmont, in 1749, of a rich and distinguished family. His early education was very defective, like that of most men of his rank and country at that time. At the age of sixteen he joined a provincial regiment which was only called together a few days during the year. For some years he led a restless and dissatisfied life, travelling in Italy, France, England, Holland, and then through the countries of northern Europe. He next left the military service, and, driven by ennui, tried, among many other things, to write dramatic poetry, and met with great success, his first play, Cleopatra, put on the stage in 1775, being received with general applause. He now determined, at the age of twenty-seven years, to devote all his efforts to attaining a position among writers of tragic poetry. Sensible of his deficiencies, he went to work zealously to educate himself. In seven years he composed fourteen tragedies, studied Latin and Tuscan, and even, in his forty-eighth year, made himself master of Greek. At Florence he became intimate with the Countess of Albany, wife of Prince Charles Edward Stuart, a daughter of the house of Stolberg. His passion had the effect of stimulating him to strive more earnestly after poetic fame. To continue his labours in a free and independent manner, he broke the last tie that bound him to his country; and making over all his fortune to his sister, save a moderate income for himself, he lived by turns in Florence and Rome. Prince Charles now dying, Alfieri married his widow, and changed his places of abode to Alsace and Paris. He was at Paris when the revolution broke out, but after August 10, 1792, returned to Florence. In the troubles of that stormy time he lost his books, and the greater part of the complete editions of his tragedies, published by Didot in five vols. He worked hard to the last, and died October 8, 1803. He was buried in the church of Santa Croce, at Florence, between Macchiavelli and Michael Angelo, where a beautiful monument by Canova covers his remains. Alfieri's tragedies are full of lofty and patriotic sentiments, but the language is bare and stiff, and the plots barren. Nevertheless he is the first tragic writer of Italy, and has served as a model for those who have followed him. His comedies display the same faults in a yet more glaring manner. His Abel is the most successful of all his dramatic works. This he called a *tramelogedia*—a name as novel as the work itself, which is intermediate between tragedy and opera. Besides his dramas, Alfieri composed an epic poem, lyrics, satires and poetical translations from the ancient classics. His autobiography, a striking exhibition of his character, appeared after his death. His complete works were published at Padua in 1809–11, in thirty-seven vols.

ALFONSO. See Alphonso.

ALFORD, Henry, D.D., Dean of Canterbury, was born in London, 7th October, 1810, of a Somersetshire family, which for five generations had contributed clergymen to the church. He was an only child, and his mother died in giving him birth. His father at this time was practising law, but afterwards took orders. He was educated at home to the age of seven, and afterwards attended several schools, including the grammar-school at Ilminster. He entered Cambridge University in October, 1827, having won a scholarship in Trinity College. He graduated B.A. in 1832, and obtained a good position in the classical tripos. He now took pupils, of whom he procured a large number, so that for six or seven hours a day he was engaged in tuition. In his twenty-sixth year he married his cousin Fanny, daughter of the Rev. Samuel Alford. His first work of scholarship was a Greek grammar, written during courtship for the use of his wife. He also published in 1833 the first-fruits of his labours in another field, in a work entitled Poems and Poetical Fragments. He was ordained deacon in October, 1833, elected Fellow of Trinity, October, 1834, and ordained priest in November of the same year. In 1835 he entered on parochial duty as vicar of Wymeswold, Leicestershire. The same year he took his M.A. degree. During a long period of rural retirement he gradually made himself known by his literary labours. As an occasional writer of minor religious poetry he took a recognized rank among the authors of the day. He frequently lectured in his parish and elsewhere on a variety of subjects, and in 1841–42 he held the office of Hulsean lecturer at Cambridge. In 1838 he edited the works of Donne, and in 1839–40 a literary periodical called Dearden's Miscellany. In 1842 he was appointed examiner in logic and moral philosophy to the University of London, and held the appointment till 1857. In the previous year he had begun the great work of his life, his edition of the Greek Testament with commentary, which occupied him for twenty years. At first he designed it merely for the use of students at the university, and proposed to combine with the received text the readings of Buttmann and Lachmann, but his plan enlarged as he proceeded,

and he finally extended it to a digest of the readings of the principal manuscripts, and of the results of German scholarship. The character of his commentary was strictly critical. In the summer of 1847 he visited Bonn, to perfect himself in the knowledge of the German language. The first volume of his commentary was published in 1849, in which year he took his degree of B.D. at Cambridge, the fourth and last in 1861. In 1853 Alford was translated to Quebec Chapel, London, where his father had previously ministered, and in 1857 he was appointed Dean of Canterbury, obtaining the same year the degree of D.D. From January, 1866, to August, 1870, he edited the Contemporary Review, and he frequently contributed to Good Words and other periodicals. He died 12th January, 1871. The leading works of Dean Alford, besides those already mentioned, are—Chapters on the Poets of Ancient Greece (1841); Sermons, various dates; Psalms and Hymns (1844); Homilies on the Acts of the Apostles (1858); Letters from Abroad (1865); Year of Prayer (1866); Year of Praise (1867); Poetical Works (1868); New Testament for English Readers (1868); Greek Testament (abridged, post 8vo, 1868); Essays and Addresses on Church Subjects (1869); Plea for the Queen's English (new edition, 1869); Riviera, Pen and Pencil Sketches (1870); Greek Testament (new edition, four vols. 8vo, 1871). His last work was a commentary on the Old Testament, part of which has been published. The Life, Journal, and Letters of Henry Alford, edited by his widow, was published in 1873. Besides his theological and scholarly attainments, Alford was a skilful amateur musician and painter, and had a wonderful aptitude for artistic mechanical work, in which he took great pleasure.

ALFRED (or ÆLFRED) THE GREAT, King of England, one of the most illustrious rulers on record, was born at Wantage, in Berkshire, A.D. 849. He was the son of Ethelwolf, king of the West Saxons, and his wife Osburga or Osburh; and though the youngest of five sons, he succeeded to the crown on the death of his brother Ethelred, in 871, at a time when the Danes, or Northmen, who were formidable to the Saxons as early as 787, had extended their conquests and devastations very widely over the country. He took part in the victory of Ashdown, gained over them before his accession, and soon after that event he was the English leader in the battle of Wilton, which, though indecisive in result, led to a short period of peace. Though still quite a young man he had already given decisive proofs of his generalship and courage, which were soon again to be called into requisition. The Danish encroachments were renewed in 876 and 877, and though the enemy twice made peace with Alfred and promised to leave his dominions, they returned in greater force in 878, and overran a great portion of the kingdom of the West Saxons, rendering for a short time all resistance vain. It is to this period that the well-known (but quite unauthentic) story belongs of Alfred hiding in the neatherd's hut, and allowing the cakes to burn. When the people again began to arm against the enemy, Alfred fortified himself on an elevation or island (since called Athelney, or 'isle of the nobles') formed by the confluence of the rivers Parret and Tone, amid the marshes of Somerset, to which he summoned his faithful adherents, and in a few weeks was again able to take the field. It was during his abode here that he went, according to the story, disguised as a harper, into the camp of King Guthrum (or Guthorm), and, having ascertained that the Danes felt themselves secure, hastened back to his troops, led them against the enemy, and gained such a decided victory that fourteen days afterwards the Danes begged for peace. This battle took place in May, 878, near Edington, in Wiltshire; the peace was made at Wedmore, near Athelney. Alfred allowed the Danes who were already in the country to remain there, on condition that they gave hostages, took a solemn oath to quit Wessex, and embraced Christianity. Their king, Guthrum, was baptized, with thirty of his followers, and ever afterward remained faithful to Alfred. The Danes were allotted that portion of the east of England now occupied by the modern counties of Norfolk, Suffolk, Cambridge, and Lincoln. Alfred's success against the Danes led to an immediate enlargement of his own hereditary dominions, and to the spread of his influence over the adjoining territories, so that in the course of a few years he made himself virtual ruler of all England, though never formally recognized as such. The short period of tranquillity which followed was employed by him in rebuilding the towns and forts that had suffered most during the war, the city of London in particular being occupied and fortified (in 886); in erecting new fortresses, and training his people in arms and agriculture; in improving the navy; in systematizing the laws and internal administration; and in literary labours. He is said to have divided the kingdom into counties, hundreds, and tithings, and to have made these tithings, &c., responsible, as far as possible, for all offences committed within their bounds. But this system was in existence before, so that it is more probable that he only carried out a new survey of existing boundaries, and introduced certain alterations. He is also said, but upon evidence scarcely satisfactory, to have introduced the system of trial by jury. He protected the rights of the clergy, and founded monasteries at Shaftesbury and Athelney. In this age of ignorance and barbarism Alfred occupied himself with great zeal in literary pursuits and in the advancement of learning. As there was then in England scarcely one man capable of translating a word of Latin, he invited and encouraged learned foreigners to come to his court; and although it is a mere legend, if not a deliberate invention, that he founded the University of Oxford, he probably did something for the improvement of the monastic school which had previously existed in that place. He caused many manuscripts to be translated from Latin, and himself translated several works into Anglo-Saxon, such as Pope Gregory's Pastoral Care, Boethius on the Consolation of Philosophy, the History of Orosius (in both leaving out and adding passages as he pleased), Bede's Ecclesiastical History, and other works. He also compiled several original works in Anglo-Saxon, of which we may mention Laws of the West Saxons. He laid the foundation of the British navy by causing galleys of sixty oars to be built, which were as strong as any ships at that time in use. Under his auspices discoveries were made in the north, and in his Orosius he extends that author's geographical outline by a chart of Germany, an account of the Baltic, and of the icy regions towards the north, which are remarkable for their accuracy, when we take into consideration the means then available for acquiring a knowledge of these places. These peaceful labours were interrupted, about 894, by the last invasion of the Northmen in his reign, under the Viking Hasting, and after a struggle which lasted during three years, and which was rendered more desperate by the secession to the enemy of the Northumbrians and East Anglians, they were beaten in almost every engagement with the English, and finally driven out. Having acquired and merited the love, gratitude, and veneration of his subjects, this illustrious prince died, October, 28, 901, in the thirtieth year of his reign, at the age of fifty-two. His history, considering the times in which he lived, presents one of the most

perfect examples on record of the able and patriotic monarch united with the virtuous man. His disposition was gentle and amiable, and his bearing frank and affable toward all. To his enemies he was merciful and forgiving; and notwithstanding the incessant pains with which his body was racked, he never suffered his labours for the civilization and true glory of his country to be interrupted. Alfred had married, in 868, Alswith or Ealhswith, the daughter of a Mercian nobleman; she died in 902 or 905. He left two sons: Edward, called the Elder, who succeeded him; and Ethelwerd, who died in 922; his daughters were Ethelfleda, married to Ethelred of Mercia, and famous for her campaign against the Danish five boroughs; Ethelgiva, abbess of Shaftesbury; and Elfthryth, married to Baldwin, count of Flanders. The authorities for Alfred's life are the Chronicle and Asser's biography. The best modern life is that of Pauli (English trans. 1852).

ALFRETON, a market town of Derbyshire, England, 14 miles N.N.E. of Derby. The inhabitants are chiefly occupied in the neighbouring collieries and ironworks, in the potteries and adjacent quarries, or in the manufacture of hats, stockings, &c. The town is irregularly built, and many of the houses are very old. The Midland Railway passes near the town. Pop: in 1901, 17,505.

ALGÆ, a term popularly restricted to marine cryptogamous plants or sea-weeds, but which may be generally defined as comprehending all aquatic flowerless plants, whether growing in fresh or salt water, belonging to the class Thallophytes. The only absolute distinction between the Algæ and the remaining Thallophytes or Fungi is that the former contain chlorophyll, whilst the latter do not. Lindley, following Endlicher, has arranged the Algæ under five orders:—Diatomaceæ, Confervaceæ, Fucaceæ, Ceramiaceæ, and Characeæ (which see).

ALGARDI, Alessandro, Italian sculptor, was born in Bologna about the end of the sixteenth or the beginning of the seventeenth century. He was educated in the academy of Ludovico Caracci, and went, when twenty years old, to Mantua. In 1625 he went to Venice, and thence to Rome. The Duke of Mantua had recommended him to Cardinal Ludovici, nephew of Pope Gregory XV., who was intent on renewing the magnificence of the gardens of Sallust. Here Algardi was employed in restoring mutilated antiques (for example, a Mercury), and in preparing original works, including several groups for the churches of Rome, and also became acquainted with his countryman Domenichino. The statues of St. Magdalen and St. John the Baptist, for the church of St. Silvester, on the Quirinal, were his first great works. Cardinals and princes now availed themselves of his talents, and the French court wished him to come to Paris; but the Prince Pamfili succeeded in retaining him in Rome, where he died, June 10, 1654. A marble relief with life-size figures over the altar of St. Leo, in St. Peter's church, representing that pontiff threatening Attila with the vengeance of St. Peter and St. Paul if he should continue his advance on Rome, is his most renowned work. It is the largest bas-relief in existence. Algardi ranks next to Lorenzo Bernini among Italian sculptors of the seventeenth century, and especially excelled in the representation of nude figures. His God of Sleep, in the Villa Borghese, has often been taken for an antique.

ALGAROBA-BEAN. See Carob-tree.

ALGAROTTI, Francesco, Count, born at Venice in 1712, an Italian writer, who united the study of the sciences with a cultivated taste for the fine arts. He studied at Venice, Rome, and Bologna, became a distinguished connoisseur in the fine arts, and excelled in mathematics, astronomy, metaphysics, and natural philosophy. He was acquainted with Latin and Greek, and paid great attention to the Tuscan style and language, to perfect his knowledge of which he went to Florence. His celebrity as an author commenced at an early period. When twenty-one years old he wrote at Paris the greater part of his Neutonianismo per le Donne (the Newtonian Philosophy adapted for the Ladies), after the model of Fontenelle's Plurality of Worlds, and thereby laid the foundation of his fame. Until 1739 Algarotti lived alternately in Paris, at Cirey, with the Marchioness du Châtelet, and in London. At that time he made a journey to St. Petersburg, and on his return visited Frederick II., then crown-prince, who was residing at Rheinsberg. The prince was so much pleased with him, that, after his accession to the throne, he invited him to live with him, and raised him to the rank of count. He was not less esteemed by Augustus III., king of Poland, who conferred on him the office of privy-councillor. Algarotti now lived alternately at Berlin and Dresden, receiving from Frederick in 1747 the order of merit and the office of chamberlain. In 1754 he returned to his own country, and died at Pisa of consumption, in 1764, after suffering long from hypochondria. He himself formed the design of the monument which Frederick II. caused to be erected over his grave, in the court of the *campo santo* at Pisa. Algarotti's knowledge was extensive and thorough in many departments. In painting and architecture he was one of the best critics in Europe, in proof of which we may refer to his work entitled Saggi sopra le Belle Arti (Essays on the Fine Arts), and to the paintings he selected for the Dresden Gallery. Many artists were formed under his direction. He drew and etched with much skill. In his works, which embrace a great variety of subjects, he shows much wit and acuteness. His poems, though not of a very high order, are pleasing, and his letters are considered among the finest in the Italian language. A collection of his works appeared at Venice, from 1791 to 1794, in seventeen vols.

ALGARVE (or Faro), a maritime province of Portugal, extending across the southern coast of the kingdom, is bounded north by the province of Alemtejo, east by the Spanish province of Huelva, south and west by the Atlantic Ocean. It has a mountainous surface, with some fertile tracts, in which excellent oil, wine, figs, and almonds are produced, and a coast indented with good bays and harbours. Its tunny and sardine fisheries are productive. Faro is its capital. The area is 1873 square miles. Pop. (1890), 229,000; (1900), 254,851.

ALGAZZALI, or Alghazzâlî, Abu Hamed Mohammed, an Arabian philosopher, Persian by birth, was born at Tûs in Khorasan in 1058 or 1059. He first taught theology at Bagdad, but left his chair and travelled in Syria, and lived for some time in Damascus, after which he returned to Persia and resumed teaching. He died in his native town in 1111. The details of his life given by biographers are numerous but contradictory. He was one of the most prolific of the Arabian authors. One of his writings, called the Destruction of the Philosophers, was answered by Averroes in a book entitled the Destruction of the Destruction. He also wrote several moral treatises. Algazzali, as a disciple of the Sufis, was an opponent of the prevailing Aristotelian philosophy of the day, and predisposed to the mystical dogmas of emanation, to which, after a keen and critical study of philosophy, he entirely resigned himself. See Dugat's Histoire des Philosophes et des Théologiens Musulmans (Paris, 1878). See also the article Scepticism.

ALGEBRA, the art of carrying on the arithmetical processes of adding, subtracting, multiplying, and dividing by means of symbols. Algebraical symbols are of two kinds:—First, symbols which represent quantities, and which at the end of an algebraical operation may be replaced with numbers; and, second, symbols which denote operations. $xy + cz + dy^2$ expresses by algebraical symbols that a number put for x is to be multiplied by a number put for y, a number c multiplied on a number z, a number d multiplied on the number y multiplied on y, and the sum taken of these three products. Works on algebra usually commence by giving examples of the substitution of quantities for symbols, and the performing the operations indicated on these quantities. Addition, subtraction, multiplication, and division of algebraical quantities exercise the patience of the learner a good deal, but he begins when he comes to what is called *simultaneous equations of the first degree* to see some utility in the new language he has been learning. His experience from this point forward through *quadratic* and higher equations, if he have any taste for mathematics, should be pleasant enough as he grows in the exercise of the new power which he feels himself possessed of. Algebra is more than a language; it not merely expresses relations and ideas, it gives a means of exhibiting the results of those ideas and relations; for instance, $x^2 - 7x + 12 = 0$ expresses the fact that a certain quantity x multiplied on itself, made less by seven times itself and greater by twelve, will disappear. An operation puts it in the form $(x - 3)(x - 4) = 0$, which shows that for the equation to hold true x must either be the numerical quantity 3 or the quantity 4. We shall take another example, $\frac{x}{6} + \frac{y}{8} = 1$ represents a straight line (as one interpretation), $\frac{x}{3} + \frac{y}{4} = 1$ represents another straight line; if we attempt to find common values of x and y which will simultaneously satisfy these equations we shall not be able, and thus it is discovered that the straight lines are parallel. On the other hand, if the equations of two straight lines do admit of simultaneous values of x and y satisfying them both, we know that the lines intersect, and this particular value of x and the corresponding value of y determine the point of intersection. In the higher branches of algebra the learner comes to feel that he is being taught to use a brain-saving machine; he finds that in many cases he merely states what he knows about something, and after a few simple processes, differentiating or integrating, his expression is no longer merely what he knows, it tells him something quite different, which probably he did not know before, or he in a new way comes upon an old result. Those subjects of mathematics which are treated of in text-books on algebra are too commonly imagined to be summarized under the title algebra. Geometrical progression is not algebra, and the operations in trigonometry are as algebraical as the solution of a quadratic equation is. There are various excellent text-books on algebra suited for school and college, but these we need not here particularize.

The first feeble trace of algebraic method is to be found in Diophantus, a late Greek writer of unknown date (see DIOPHANTUS), variously placed in the fourth or sixth century of the Christian era. Diophantus occupied himself with the branch of algebra called indeterminate analysis; he found methods for the solution of simple and quadratic equations, and he made a contribution to the method of algebra, which did not bear immediate fruit, by the use of symbols. He used the Greek letter *psi* inverted as a sign of subtraction. This was his only functional sign, but a far more important, because more generic, symbol was the use of the syllable *os*, the final syllable of Greek *arithmos*, for the unknown quantity. He announced the law that *minus* multiplied by *minus* produces *plus*. After the Greeks the Arabians were the next people in the line of western civilization who cultivated the mathematical sciences. The first Arabian treatise on algebra was published in the reign and under the patronage of the great Kaliph Al Mamun (813–833) by Mohammed Ben Musa. The work of Ben Musa being admittedly a compilation, and being acknowledged by the Arabs to be the first work in their literature treating of algebra, a difficult question has arisen as to the sources from which Mohammed drew his information, and it is not certain whether his authorities were Diophantus and the Greek geometers, or the Indian astronomers with whom he was acquainted, and who have been recently shown to have had a knowledge of algebra which admits of some comparison with that of the Greeks. Diophantus and other Greek geometers were subsequently translated by the Arabians, and they pursued the study of the mathematical sciences with great zeal, but they did little to advance them by new discoveries, and besides giving algebra a name and transmitting what they derived of it from other sources to Europe, there is little to credit them with in its history. In 1202 Leonardo Fibonacci of Pisa, an intelligent Italian merchant, who had travelled and studied in the East, published his Liber Abaci, in which he used the Arabian or Indian numerals, and treated of algebra as then understood in the Arabian school. A second edition of his work appeared in 1228. It exhibits competent knowledge of the methods of Diophantus and the Arabians. From this time to the discovery of printing considerable attention was given to algebra, and the work of Ben Musa and another Arabian treatise, called the Rule of Algebra, were translated into Italian. The first printed work treating on algebra (also on arithmetic, &c.) appeared at Venice in 1494, the author being a monk called Luca Pacioli da Bergo. It closely follows Leonardo, and adopts the same methods. The algebra extends to equations of the first and second degree, which are divided into cases and resolved by particular rules. This work, which fairly represents the knowledge of its time, is thus not in advance of Diophantus. Rapid progress, however, now began to be made in the discovery first of particular methods and then of general formulæ of algebra. Scipio Ferreo first found a method of resolving equations of the third degree, Tartaglia found three additional methods, Cardan perfected them and discovered a method applicable to all cubic equations. His work was published in 1545. Tartaglia, who had confided his methods to him on his oath not to reveal them, published a work in the following year. Ludovico Ferrari, a pupil of Cardan, discovered a method for the resolution of equations of the fourth degree. About the same period the German Stifel introduced the signs $+$, $-$, $\surd$, and Recorde the sign $=$. Recorde wrote the first English work on algebra. François Vieta, a French mathematician (1540–1603), first adopted the method which has given so great a superiority and so unlimited an extension to modern algebra. We have seen that Diophantus adopted a generic sign for the unknown quantity; Vieta was the first who used general symbols for known quantities. Up till this time the processes of algebra had been conducted in ordinary language with only verbal abbreviations, and geometrical demonstrations were given in support of the principles involved in them. By the improvement of Vieta algebra acquired an independent means of demonstration, and

now first deserved to rank as a distinct science. It was soon perceived that this independent method could be extended to geometry itself, and Vieta was the first who made the application. Accordingly his material contributions to the science were considerable. He discovered the doctrine of angular sections which laid the basis of analytical trigonometry, and found a general method of resolving equations by approximation. Albert Girard extended the theory of equations by the supposition of imaginary quantities, and found that every equation has as many roots as there are units in its degree. Harriot discovered negative roots, and established the equality between the number of roots and the units in the degree of the equation. He also invented the signs $<$ $>$, and Oughthred that of $\times$. Descartes, though not the first to apply algebra to geometry, has, by the extent and importance of his applications, commonly acquired the credit of being so. The same discoveries have also been attributed to him as to Harriot, and their respective claims have caused much controversy. He found the roots of equations of the higher degrees by representing them geometrically, and obtained by means of algebra the definition and description of curves. Since his time algebra has been applied so widely in geometry and higher mathematics that we are unable to pursue its history in detail. The names of Fermat, Wallis, Newton, Leibnitz, De Moivre, MacLaurin, Taylor, Euler, D'Alembert, La Grange, La Place, Fourier, Poisson, Gauss, and many others, will indicate the abundance of material. We close with a single remark as to modern extensions of the domain of the algebraic method beyond the sphere of mathematics. Condillac observed that this method was the type of all exact logic, and Boole, Jevons, and others have applied it with great freedom not only to formal logic but to political economy. As to the value of these extensions we cannot here speak.

ALGECIRAS, or ALGESIRAS, a seaport of Spain, on the west side of the Bay of Gibraltar, and 7 miles north-west of Europa Point. The old town, once possessed of great strength, but now in ruins, stood on the Isla Verde; the modern town stands on the mainland, on an acclivity rising rapidly from the shore, and though unwalled, is defended by a fort. A brisk coasting trade is carried on. Near Algeciras, in July, 1801, the English admiral Saumarez failed in an attack on a strongly posted French fleet, but soon after he defeated the combined French and Spanish fleets. In Jan.–April, 1906, a conference between the powers held here decided matters in dispute between France and Germany regarding Marocco. Pop. (1897), 12,778.

ALGERIA, a French colony in the north of Africa, bounded on the north by the Mediterranean, on the east by Tunis, on the west by Marocco, and on the south by the Desert of Sahara. The boundaries are not well defined, and many of the nominally dependent tribes in the more thinly peopled districts continue in a state of semi-independence. The country is divided into three departments—Algiers, Oran, and Constantine, of which the area and population are given as follows in the official returns:—

	Sq. miles.	Pop. 1886.	Pop. 1906.
Algiers,	65,929	1,380,541	1,596,333
Oran,	44,616	963,439	1,099,597
Constantine,	73,929	1,566,419	2,025,044
	184,474	3,910,399	4,720,974

The coast-line is about 550 miles in length; it is steep and rocky, and though the indentations are numerous the harbours are much exposed to the north wind. The country is traversed by the Atlas Mountains, two chains of which—the Great Atlas, bordering on the Sahara, and the Little or Maritime Atlas, between it and the sea—run parallel to the coast. The former attains a height of about 7000 feet. The intervals are filled with lower ranges, and numerous transverse ranges connect the principal ones and run from them to the coast, forming elevated tablelands and inclosed valleys. The rivers are numerous, but many of them are mere torrents rising in the mountains near the coast. The Shelif, which flows into the Mediterranean near Mostaganem, is by much the largest; the Kibir, the Isser, the Seibus, &c., are also considerable. There are also, both on the coast and in the interior, extensive salt lakes or marshes (*Shotts*), which dry up to a great extent in summer. The principal of these are Melrir, Shergi, and Gharbi. The country bordering on the coast, called the Tell, is generally hilly, though in some places a flat and fertile plain extends between the hills and the sea, and the hills are everywhere intersected by fruitful valleys. The principal maritime plains are the Metidjah, behind Algiers, the plain of Oran, and that of the Shelif. In the east of Algeria, south of that part of the Little Atlas which bears the name of Mount Aures, there is an extensive hot plain which sinks in the Shott Melrir below the sea-level. This depression was probably occupied in ancient times by a lake of considerable magnitude, the Palus Tritonis, which had an outlet near Gabes into the Mediterranean Sea. The tertiary strata of this depression are in the lowest parts soaked with water, which having been brought to the surface by means of artesian wells, has dotted the plain with numerous artificial oases. The principal oases of the Sahara region are El Wad, Tuggurt, and Wargla. The temperature varies with elevation, configuration, and local circumstances. In the Sahara the heat in summer is always excessive, but in many parts of the coast the temperature is moderate and the climate healthy. The mean temperature in Algiers is about 66°·5, the average of the hottest month is 83°. It has been proposed to introduce the waters of the Mediterranean into the Shotts, or salt lagunes of the interior, these and the surrounding region being considerably below the sea-level. This it is supposed would improve a large portion of the country; but it seems doubtful if the scheme is not too costly.

About 9,000,000 acres in all are now under cultivation in Algeria, and produce good wheat, barley, oats, and pulse. After the various kinds of grain the olive is the most important object of cultivation in the country, while there are now over 390,000 acres laid down in vines. The cultivation of fine sorts of vegetables occupies a great deal of the attention of the colonists in the vicinity of the town of Algiers, and there is a very considerable export of early vegetables, especially potatoes and pease, for the supply of the London and Paris markets. The growth of cotton is declining. Tobacco, on the other hand, is becoming every year a more important agricultural product. Great quantities of wine are now produced, much being sent to France. The quality is only middling, but, according to a report recently made by M. Dejernon, professor of agriculture in the Basses-Pyrénées, who was sent by the French minister of agriculture to inquire into the subject, this is solely due to bad cultivation and bad processes of manufacture, the soil of Algeria being in his opinion admirably adapted for the culture of the vine. The production of raw silk is on the increase, but the quantity is still unimportant. The cultivation of the date-palm is being extended very rapidly by artificial irrigation. A fibre called *alfa* (*Macrochloa arenaria*), a variety of esparto, has recently acquired great industrial importance, furnishing an excellent

material for paper-making. It grows wild on the high plateaux over an area of more than 15,000 square miles. To show the rapid development of this product as an article of commerce it may be mentioned that while in 1869 the amount exported was only 4000 tons, the annual export is now somewhere about 70,000 or 80,000 tons. Wood-pulp is said to be latterly taking its place in paper-making. Agriculture in Algeria often suffers much from the ravages of locusts. In some years more than half of the crops is said to be destroyed by this insect. Another great enemy that settlers on fresh land have to deal with is the small fan-palm (*Chamærops humilis*), which is found almost everywhere in Algeria, and is difficult and costly to extirpate. The forests of Algeria form one of the principal sources of wealth of the colony, and engage the constant attention of the government. They are estimated to cover an area of about 8700 square miles, but from time immemorial have been diminishing in extent every year, partly owing to the devastations of the natives, who used to burn down large tracts before the rainy season, in order to make the grass grow more abundantly and to render it more easily accessible to their flocks. Stringent measures have been taken with the view of repressing this practice, and are said to have had the best results. Among the trees that grow in the forests of Algiers are various sorts of pines, the Atlas cedar, oaks (including the sweet-acorn oak (*Quercus ballota*) and the cork-oak), the ash, myrtle, pistachio-nut, mastic, carob, and wild olive. Much has been done by the government in the way of introducing foreign trees, especially the Australian *Eucalyptus globulus* or blue gum. Australian wattles (*Acacia pycnantha*) have also been introduced, the wood being useful for various purposes and the bark being valuable for tanning.

Among the domestic quadrupeds of Algeria the horse occupies the first place. The Algerian horse is slender, light, and sinewy, and hence best adapted for racing and for military purposes. The mule, which the dry and hot climate suits well, is the animal most largely used as a beast of burden. Horned cattle are reared everywhere and are remarkably abundant, but owing to the absence of rich pasture grass and good winter fodder are ill fleshed and yield hardly any milk. Sheep are numerous, and form almost the sole wealth of the most southerly tribes. Many are exported to France. Pigs were unknown in Algeria till after its conquest by the French. French authorities on agriculture have recently been commenting very severely on the imperfect methods of culture generally practised in Algeria, where the common distribution of the cultivated soil is between cereals and fallow, just the ordinary Arab system. Practically no grass or fodder plants are grown, no dung is used, and the land is allowed to be overrun with weeds. The colonists, the agricultural writers insist, must share their land between cereals and forage, must study the best races of cattle, and make themselves familiar with the special conditions of African agriculture. In regard to this subject the British consul-general, Sir R. L. Playfair, in a blue-book of 1895, remarks: 'There is much truth in this, but it seems to me that the two great obstacles to successful agriculture in Algeria are the uncertainty of its seasons and the impossibility of competing with such countries as India and America'; and he quotes a remark by a high functionary, to the effect that he had spent thirty years in the colony and had seen thirty exceptional winters.

The mineral wealth of Algeria is known to be very considerable, although hitherto it has not been utilized to any great extent. Iron and copper are found in great abundance in the Algerian mountains. As to the working of the mines, the most important are those of iron, zinc, lead, and copper. In 1909 there was exported iron ore to the value of £390,880, chiefly to Great Britain, zinc to the value of £431,240, chiefly to Britain, France, and Germany. Some copper, lead, and antimony ore is also exported. Valuable deposits of phosphate of lime exist and are now being exploited. Sulphur is obtained, and excellent lithographic stone is found. There are several mineral springs, and the ruins of baths prove that they were used by the ancient Romans.

The trade of Algeria has greatly increased under French rule, and more especially since its products were admitted into France duty free, which they were for the first time in 1851. France, Spain, and England are the countries with which the trade is principally carried on, and three-fourths of the whole trade is with France. The exports from this last country to Algeria are chiefly woven fabrics and manufactured goods of all sorts, grain, flour, wines, spirits, sugar, and articles of dress. The imports which it receives from Algeria are grain, sheep, cattle, wool, olive-oil, raw hides, &c. England furnishes coal, cottons, iron, and metal wares, and receives barley, alfa, iron ore, lead ore, &c. The exports to Britain in 1909 amounted to £637,000; imports from Britain £554,800. The annual imports and exports together usually form a total of about £30,000,000. Besides Algiers the principal ports are Bona, Philippeville, Bougie, Oran, Shershel, Tenes, Mostaganem, and Nemours. The manufacturing industries of Algeria are naturally unimportant. They are chiefly confined to the making of morocco leather and the weaving of carpets, muslins, and silks. French money, weights, and measures are generally used. There is a daily service of steamers to France, and about 2000 miles of railway, the principal lines being from Algiers to Oran and from Philippeville to Constantine. There is also a considerable network of telegraph lines, with more than 10,000 miles of wire.

The two principal native races inhabiting Algeria are Arabs and Berbers. The former, who inhabit chiefly the southern parts, are mostly true nomads, dwelling in tents and wandering from place to place. A large number of them, however, are settled in the Tell, where they carry on agriculture and have formed numerous villages. The Berber race, here called Kabyles, are the original inhabitants of the territory and still form a considerable part of the population. They are mainly distributed over the mountainous parts of the province of Constantine, but are not wanting in the plains and in the other provinces. They preserve the ancient Berber language, but use Arabic characters in writing. Part of them have already got mixed up with Arab tribes, and this amalgamation is still going on. Among the less numerous races that inhabited the land before the French occupation, and still found there, are the Moors, a mixed race, partly descended from Arabic ancestors and partly from the ancient Mauretanians. They live in the towns and villages on or near the coast, and earn a scanty livelihood as petty tradesmen or mechanics. The Jews form a small but influential part of the population (about 45,000). Formerly they were subject to much oppression, but since their emancipation under French rule many of them have become wealthy and they are rapidly multiplying. Formerly they were almost all engaged in trade, but now many of them are to be found acting as clerks and even as public officials. Till 1865 they were excluded from public offices, but an act passed in that year declared both Mohammedan and Jewish natives entitled to all the prerogatives of French citizens on placing themselves completely

under the civil and political laws of the French, and the Jews have shown a great readiness to do this. There still remain to be mentioned the Biskirh, an Arab race from the Oasis of Biskarah; the Mozabites, an African (Berber) race belonging to the oasis bordering on the desert; and the Kolongis, who are the descendants of Turkish janizaries and native women, and are pretty numerous in Algiers and other towns. There are now hardly any pure Turks in Algeria. Except the Jews all the native races of Algeria are Mohammedans.

There are now a considerable number of colonists in Algeria, provision being made for granting concessions of land, which, after being occupied and cultivated by them for five years, become their absolute property. After the Franco-German war, and the cession of Alsace and part of Lorraine to Germany, the inhabitants of the ceded districts were invited to settle in Algeria, and to some extent they have taken advantage of the offer, receiving grants of land in the colony. According to the census of December, 1886, there were 261,591 colonists of French origin in Algeria, and 233,721 other Europeans (chiefly Spaniards and Italians); in 1901 the respective numbers were 364,257 and 245,853.

Since 1871 Algeria has been governed by a civil governor-general, who has supreme military authority and legislative powers, which he shares with a council appointed by the French government. The Sahara territory, inhabited by nomad tribes, is still under military rule. The three provinces are divided into twelve departments, each of which is under a prefect and sub-prefects. A council consisting of the prefects, the archbishop, the military governor, and other members appointed by the French government, meets at Algiers under the presidency of the civil governor every October, to deliberate on the affairs of the colony. Four kinds of taxes are levied on the natives: the *achour*, a tithe upon cereals; the *hockor*, the rent of the land (not levied generally); the *zekkat*, an impost upon cattle; and the *lezma*, a sort of tax upon capital, levied only on the nomad tribes of Sahara. All the taxes are levied in money. The revenue and expenditure of the colony exceed two millions sterling annually. The military expenditure and the expenditure for the administration of justice and public worship are included in the general budget of France. Algeria is represented both in the senate and chamber of deputies of the mother country.

History.—The country now called Algeria was known to the Romans as Numidia. The two most powerful tribes were the Massyli to the east, and the Massæsyli to the west. Masinissa, prince of the former, took part with the Romans in their war with the Carthaginians, and was rewarded with the title of King of Numidia and the greater part of the territories of his rival Syphax, prince of the Massæsyli, who had sided with the Carthaginians (202 B.C.). About 150 years later Juba, one of the successors of Masinissa, sided with Pompey against Cæsar, and his kingdom was annexed to the Roman province of Africa (46 B.C.). Algeria was valuable to the Romans for its supplies of grain. It flourished under their rule, and early received the Christian religion. Algeria was conquered by the Vandals in 430–431 A.D., and recovered by Belisarius for the Byzantine Empire in 533–534. (See VANDALS.) About the middle of the seventh century it was overrun by the Saracens, and after this time divided into numerous petty states, most of which relapsed into barbarism. The town of Algiers was founded about 935 by Yussef Ibn Zeiri, and the country successively fell under the Moorish dynasties of the Zeirides, Almoravides, and Almohades. After the overthrow of the empire of the Almohades by the Merinides, about 1269, Algeria broke up into a number of small independent territories. A separate kingdom grew up under a Merinide dynasty at Tlemcen in the west of Oran, and the towns of Algiers, Oran, Bougie, and Tenes acknowledged at first no external authority, although they were ultimately rendered tributary by the Kingdom of Tlemcen. The Moors and Jews who were driven out of Spain by Ferdinand and Isabella at the end of the fifteenth century settled in large numbers in Algeria, and revenged themselves on their persecutors by the practice of piracy. On this account various expeditions were made by Spain against Algeria, and by 1510 the greater part of the country was made tributary. A few years later the Algerians, who disliked the Spanish yoke, invited to their assistance the Turkish pirate Horush (or Haruj) Barbarossa, who became Sultan of Algiers in 1516, and organized there a system of piracy which was long the terror of European commerce, and was never wholly suppressed till the French occupation. His brother and successor Hayraddin (Khair-ed-din) put Algiers under the protection of Turkey (about 1520). He fortified the town and made a strong mole to protect his ships. In this work he is said to have employed 30,000 Christian slaves for three years. The Algerian janizaries were regularly recruited in Turkey. About 1600 they obtained from the Porte the right to choose among themselves a dey, who was to share the power with the pasha deputed by the sultan. From this time frequent disputes arose between the deys and pashas, till in 1710 the pasha was expelled and the dey became supreme ruler with a nominal dependence on the Porte. From this time the internal history of Algiers presents little remarkable beyond the frequent bloody revolutions of the seraglio accomplished by the janizaries, who allowed few deys to die a natural death. The depredations of the Algerian pirates were a continual source of irritation to the Christian powers, who sent a long series of expeditions against them. Among the most memorable of these were the expedition of Charles V., the French expedition of 1617, the English expeditions of 1620 and 1655, the English and Dutch of 1669 and 1670, and the French expeditions of 1681–83, in the last of which the fortifications were destroyed by Duquesne. After this the Algerians entered into commercial treaties with France and England, but they soon resumed their piratical practices, and a new series of efforts had to be made to suppress them. In 1815 a United States fleet attacked an Algerian one off Cartagena, and having defeated it forced the dey to agree to a peace in which he recognized the American flag as inviolable. In 1816 Lord Exmouth led an expedition against the Algerians, which bombarded Algiers (August 27–28), exacted a treaty according to which all the Christian slaves were at once released, the sums paid as ransom for Italian captives were restored, and the dey undertook for the future to treat all his prisoners of war as the European law of nations demanded. The piratical practices of the Algerians were nevertheless soon renewed, and went on till the French, who had for several years been taking ineffectual measures to obtain satisfaction for injuries from the Algerians, fitted out the final expedition of conquest in 1830. They gave a pledge to the British government that their occupation of the country was not to be final, but this was afterwards withdrawn, and Great Britain acquiesced in its withdrawal, on condition that Tunis and Marocco should not be disturbed. Algiers was occupied on 5th July, and measures were soon after taken to subdue the interior. The dey (Hussein) had retired, and the country was without a government, but resistance was organized by Abd-

el-Kader, an Arab chief whom the emergency had raised up. He began his warfare with the French by an attack on Oran in 1832, and after an obstinate struggle the French, in February, 1834, consented to a peace with him, in which they acknowledged him as ruling over all the Arab tribes west of the Shelif by the title of Emir of Maskara. This peace was, however, soon broken. In June, 1835, the French general Trezel, then commanding in Oran, headed an expedition against Abd-el-Kader, which terminated in the complete defeat of the French on the Makta (June 28). Drouet d'Erlon, the first governor-general, to whose weakness the advances of Abd-el-Kader were attributed, was now recalled, and was succeeded by Marshal Clauzel. Clauzel was successful in capturing Maskara, the centre of Abd-el-Kader's power; but the failure of an expedition to the Tafna and the defeat of General d'Arlenges on this river in April, 1836, raised the influence of the emir to the highest pitch, and occasioned the outbreak of a petty warfare in other parts of the land. While this was happening in the west Clauzel undertook an expedition against Constantine, which completely miscarried, and in consequence of this the marshal was recalled in February, 1837. General Damrémont, his successor, resolved first of all to effect at any cost the capture of Constantine, and in order to have his hands free made peace with Abd-el-Kader (May, 1837), leaving to him the whole of Western Algeria except some coast towns. On the 13th of October Constantine was taken by storm. Damrémont, however, had been killed the previous day. The subjugation of the province of Constantine followed. Meanwhile Abd-el-Kader was gradually strengthening himself and preparing for another conflict with the French, and in November, 1838, he suddenly broke into French territory with a superior force. The French governor, Marshal Valée, found it expedient to confine himself to defensive operations, and for a time the supremacy of the French was endangered. Matters took a more favourable turn for them when General Bugeaud was appointed governor-general in February, 1841. He followed the plan of at once wearing out the several refractory Arab tribes by incessant raids, in the carrying out of which he had the assistance of Lamoricière, Cavaignac, Changarnier, and other able officers, and destroying the power of the emir by expeditions on a larger scale. In the autumn of 1841 Saida, the last fortress of Abd-el-Kader, fell into Bugeaud's hands, after which the only region that held out against the French was that bordering on Marocco. Early in the following year this also was conquered, and Abd-el-Kader found himself compelled to seek refuge in the adjoining empire. From Marocco Abd-el-Kader twice made a descent upon Algeria, on the second occasion defeating the French in two battles; and in 1844 he even succeeded in raising an army in Marocco to withstand the French. Bugeaud, however, crossed the frontier, and in August inflicted a severe defeat on this army at Isly, while the French fleet, under the Prince de Joinville, bombarded the towns on the coast. The Emperor of Marocco was at length compelled to agree to a treaty, in which he not only promised to refuse Abd-el-Kader his assistance, but even engaged to lend his assistance against him. Reduced to extremities Abd-el-Kader surrendered on 27th December, 1847. Contrary to the conditions of surrender he was at first taken to France and treated as a prisoner, but was afterwards released on his personal engagement not to return to Algeria by Prince Louis Napoleon, when president of the French Republic. In 1848 Algeria obtained the right to send deputies to the French National Assembly. The country was yet far from subdued; the Kabyles in particular, and the Arabs in the south, made protracted resistance, and rose again and again in insurrection against the yoke which was attempted to be imposed on them. Algeria thus became a school for French generals. Pelissier and Canrobert repressed the rebellious Kabyles in 1849. In 1851 St. Arnaud subdued Little Kabylia. In 1852 Macmahon succeeded against Eastern Kabylia, and in 1856 Great Kabylia was subdued by General Randon. An Arab rebellion occurred in 1859. In 1864 Macmahon, who succeeded Pelissier as governor-general, put down another insurrection of the Arabs, and in 1865 a partial insurrection occurred in Oran. At this time the emperor, who had visited the colony, introduced considerable modifications into the government. Fresh disturbances broke out in the south nearly every year till 1871, when, during the Franco-German war, a great effort was made to throw off the French yoke. It was, however, completely suppressed, and in order to remove what was believed to be one principal cause of the frequent insurrections, a civil government was in the same year established, instead of the obnoxious military government, in the northern parts of the colony. The southern parts, inhabited by nomadic tribes, are still subject to military rule, and France maintains a military force of some 54,000 men in the country. Owing to this and other expenditure Algeria has always formed a burden upon the resources of France.

ALGHERO, or ALGHERI, a fortified town and seaport on the west side of the island of Sardinia, in the province of Sassari, and 17 miles south-west of the town of that name. The port is not good, but 7 miles west of it is Porto Conte, the best harbour in the island. The town is the seat of a bishop, and possesses a handsome cathedral. The inhabitants are mainly employed in wine-growing and coral-fishing. Pop. (1901), 10,779.

ALGIERS (French, *Alger*), a city and seaport on the Mediterranean, capital of the French colony of Algeria, is situated on the west side of the Bay of Algiers. It stands on the slope of a hill facing the sea, from which its array of white houses, rising in the form of an amphitheatre, presents an imposing appearance. The old town, which is the higher, is oriental in appearance. Its crowning point is the Casbah, or ancient fortress of the deys, about 500 feet above the sea. Its streets are narrow, crooked, and dirty. The houses are strong prison-like edifices, with iron-grated slits for windows, looking into central quadrangles entered by a low doorway. The modern town, which occupies the lower slope and spreads along the shore, is handsomely built, with broad streets adorned with arcades and having elegant squares. It contains the government buildings, the barracks, the commercial warehouses, the residences of the governor-general and the government officials, and the superior courts of justice. The Place du Gouvernement and the Place Bresson here are the two chief squares of the city. The fine Boulevard de la République runs along the sea-front, overlooking the bay and harbour. Algiers is the seat of an archbishop. It has a cathedral and a number of churches (one of them being an English church) and mosques. There are schools of law, medicine, science, and letters, and a lyceum; also a library and museum. It is defended by sea-batteries and other works. The French have been at great expense in improving the port and providing docks. Pop. (1896), 92,120; (1906), 154,049.

ALGOA BAY, a bay on the south coast of Africa, situated some 420 miles east from the Cape of Good Hope. At its entrance, formed by Cape Woody on the north-east and Cape Recife on the south-west, it has a width of 33 miles. Its shelter is confined to

the parts in the west or north-east, but is very valuable, as there is no other refuge for ships during the north-west gales prevalent on the Agulhas Bank. The usual anchorage is off the thriving seaport of Port Elizabeth, but shelter from east and south-east gales is unfortunately unobtainable.

ALGONQUINS, a large family of North American Indians, formerly spread over more than half the territory east of the Mississippi and south of the St. Lawrence. They surrounded the Hurons or Wyandots who dwelt on the banks of Lakes Huron, Erie, and Ontario, and consisted of four groups, namely—(1) the eastern group, comprising the Massachusetts, Narragansets, Mohicans, Delawares, and other tribes now living beyond the Mississippi; (2) the north-eastern group, consisting of the Scoffis, Abenakis, &c.; (3) the western group, made up of the Shawnees, Miamis, Illinois, &c.; and (4) the north-western group, including the Chippewas or Ojibbewas, the largest of all the tribes.

ALGUAZIL, in Spain, an officer whose business it is to execute the decrees of a judge.

ALHAMA (that is, 'the bath'), a town of Spain, in the province of Granada, on the Motril, 25 miles south-west of the town of Granada. This place is celebrated for its warm medicinal (sulphur) baths and drinking waters, and also for its romantic situation between craggy mountains. The principal bath was a Moorish edifice, the smaller was circular in form and probably a Roman erection. The town was thrown completely into ruins by an earthquake shock in Dec. 1884. On the surrounding mountains the Rio Frio rises and forms several cascades. Washington Irving, in his Chronicle of Granada, gives a spirited account of the taking of Alhama, 'the key of Granada,' from the Moors, by Rodrigo Ponce de Leon, marquis of Cadiz, in February, 1482. Byron's translation of the Romance Muy Doloroso, on the taking of Alhama, is familiar to every reader. Pop. 8000.

ALHAMBRA (*Kelât-al-hamrah*, the red-castle), the citadel of Granada when that city was one of the principal seats of the empire of the Moors in Spain. The wall which surrounded it still stands flanked by many towers, and has a circuit of 2¼ miles. Within it were included several important buildings, besides dwelling-houses; but the building to which the celebrity of the site is due is the Alcazar, or royal palace of the kings of Granada, seated on the northern brow of a lofty eminence which commands a full view of the city of Granada, and, beyond it, of a charming country, bounded in the distance by a line of hills. It is a place equally interesting to the artist, the antiquarian, and the historian. The erection of the greater part of the present building seems to have occupied almost the whole of the first half of the fourteenth century. It consists mainly of two oblong rectangular courts, the one (which was seriously damaged, if not ruined, by fire in September, 1890), called the court of the Fish-pond or of the Myrtles, 138 by 74 feet, and terminating at its northern end in an apartment 35 feet square, richly ornamented; the other, called the Court of the Lions, 115 by 66 feet, and so named from the white marble fountain in the centre supported by twelve lions. An exact repetition of this court, on two-thirds of the scale of the original, was made by Mr. Owen Jones in the Crystal Palace. It is surrounded by an arcade, with small pavilions at each end, consisting of 128 columns supporting arches of the most delicate and elaborate finish, still very perfect and retaining much of their original beauty. From the character of many of the arches in various portions of the palace they are most appropriately called stalactitic. They are formed on a peculiar system with plaster bricks of various forms in a manner universally adopted in the buildings of the Moors. The construction of the arches is remarkable for its simplicity. Over the columns, which are of white marble, and which were probably gilded, are brick piers carrying rough brick arches; above these tiles are placed diagonally forming diamond-shaped open work, running through the thickness of the walls, and a brest-summer of timber supporting the weight above. To these rough arches are attached the various enrichments, and against the tiles are placed the perforated plaster ornaments which give a singularly light appearance to the arches, and create very beautiful effects from the rays of light cast through the openings on the wall behind them.

ALI, the 'first Moslem,' son of Abu Taleb, cousin and son-in-law of Mohammed, and the bravest and most faithful of his adherents. When Mohammed assembled his kinsmen and declared his prophetic mission, he asked which among them would be his vizier. 'I am the man,' exclaimed Ali, then but fourteen years old. 'Whoever rises against thee I will dash out his teeth, tear out his eyes, break his legs, rip up his belly. O prophet, I will be thy vizier.' Ali kept his word; distinguished both by eloquence and valour, he became one of the main pillars of the new faith, and obtained the name of the *Lion of God, always victorious*. He also received Fatima, the daughter of the prophet, in marriage. After the death of Mohammed (632) his claims to the caliphate were set aside in favour, successively of Abu Beker, Omar, and Othman; but on the assassination of Othman, in A.D. 656, he became caliph, and after a series of struggles with rival claimants finally lost his life by assassination at Cufa, in the sixty-third year of his age, January, 23, 661. There was something of grandeur in the primitive simplicity and fanatical heroism of the first followers of Mohammed, and Ali formed one of the most conspicuous examples of the conjunction. The Mohammedan schism caused by the murder of Ali is well known. One sect, called the Shiites, do not acknowledge the three caliphs who preceded Ali, and are regarded as heretics by the other sect, called Sunnites. (See SUNNITES and MOHAMMED.) His posterity are numerous, and are allowed to wear green turbans in honour of their descent from the prophet. There are a number of proverbs or maxims ascribed to Ali, some of which have been translated by Golius and Ockley, but the best collection is that of Fleischer in Arabic and Persian (Leipzig, 1837). A divan or complete collection of his lyrical poems (chiefly religious in their character) was printed at Bulak, near Cairo, in 1840.

ALI, Pasha of Yanina, generally called *Ali Pasha*, a bold and able, but ferocious and unscrupulous Albanian. He was born at Tepeleni in 1741. His father, an Albanian chief, died of grief, in consequence of being deprived of all his territories and wealth by the neighbouring pasha; and his mother placed her son, then sixteen years old, at the head of her dependants. Being repeatedly defeated in his attempts to recover his father's possessions, he was at last obliged to flee to the mountains, and even to pledge his sabre to keep himself from starving. His calamities, far from softening his disposition, only engendered a mingled boldness and cunning, which gradually developed into such qualities as subtlety, dissimulation, foresight, treachery, vigour, and fiendish cruelty. His naturally implacable temper was first roused by an attack which the adjacent tribes made upon him, in the course of which they carried off his mother and sister, whom they treated with great cruelty. Ali vowed to exterminate the entire race. By the accidental discovery of a chest of gold he was enabled to raise a force of 2000 men, with which he gained his first victory, wreaked his

vengeance on the Suliotes, and entered Tepeleni in triumph. On the very day of his return he murdered his brother, whom he thought guilty of treachery, and then imprisoned his mother in the harem, on the charge of having poisoned the deceased. Here she soon after died of grief and rage. During fifty years of constant warfare he subdued a wide extent of territory, which the Porte sanctioned his holding, with the title of pasha. During the Austro-Russian war of 1787 he did such good service to the Turks that he was named Pasha of Trikala in Thessaly; at the same time he seized Yanina, of which he also got himself appointed pasha by means of bribery and a forged firman. He now, as a ruler, displayed many excellent qualities. He cleared the mountain roads of robbers, whom he formed into military troops, quelled the factions that prevailed, and, in short, so governed his dominions that security and quiet took the place of anarchy; the roads were well constructed, and commerce flourished. Shortly after this he concluded an alliance with Bonaparte, who sent him engineers; but when Bonaparte was defeated in Egypt, Ali, in 1798, seized those places on the Albanian coast which the French had taken from the Venetians. He then attacked the brave Suliotes, and conquered them in 1803, after a three years' war. The Porte now constituted him governor of Roumania, where he continued his system of oppression still more openly than before. He revenged on the inhabitants of Gardiki an injury done to his mother forty years previously, by the murder of 739 male descendants of the perpetrators, they themselves being all dead. In 1807 he entered into a second treaty with Bonaparte, and from that time his dependence on the Porte was merely nominal. Aiming at independent sovereignty, he received agents from various foreign powers, intriguing alternately with England, France, and Russia. The Porte at length determined to put an end to the power of this daring rebel; and in 1820 Sultan Mahmoud pronounced his deposition. Ali resisted several pashas who were sent to carry out this decision, only surrendering at last (February 1, 1822) on receiving assurances, confirmed by oath, that his life and property should be granted him. Notwithstanding this, Hassan Pasha was despatched four days later (February 5) to demand his head. Ali tried to defend himself, but was cut down by his assailants. His head was conveyed to Constantinople, and his treasures were seized by the Porte.

ALIAS (Latin), 'on another occasion,' 'otherwise,' often used in regard to criminals, after one name and before another, to signify that they have assumed, most likely for prudential reasons, different names at different times, as Joseph Smith *alias* Thomas Jones.

ALIASKA. See ALASKA.

ALI BEY, a ruler of Egypt, who revolted against the sovereignty of the Porte, was born in the country of the Caucasus in 1728. At the age of thirteen he was taken to Cairo, where he was sold as a slave to Ibrahim, a colonel of janissaries, and one of the most powerful men in Egypt, by whom he was educated in the military exercises of the Mamelukes. Having twice saved the life of his master he obtained his freedom, and was ultimately raised, by the influence of his powerful patron, to be one of the twenty-four beys who governed Egypt under the nominal authority of a pasha appointed by the Porte. In 1763 he attained the first dignity among the Mamelukes, and after some reverses of fortune he succeeded in putting down his rivals, assumed the virtual government of Egypt, expelled the Turkish pasha, refused the customary tribute, and coined money in his own name. In 1769 he took advantage of a war in which the Porte was then engaged with Russia, to endeavour to wrest Syria and Palestine from the Turks; and for this purpose formed an alliance with an Arab chief named Daher, who ruled almost independently over St. Jean d'Acre and the surrounding districts. He took Sidon, and gained several important successes, when he was deserted in 1771 by one of his generals, his own adopted son Mohammed Bey, who withdrew with the forces under his command to Upper Egypt. Ali was, however, still supported by his ally Sheikh Daher, and pursued his plans of conquest in Syria with remarkable success, till in 1773 he was seduced to make the attempt to recover Egypt with insufficient means. In a battle near Cairo his army was completely defeated and he himself taken prisoner. He died a few days afterwards either of his wounds or by poison.

ALIBI, a defence in criminal procedure, by which the accused endeavours to prove that when the alleged crime was committed he was present in a different place. There cannot be a more effectual defence when well founded; but it is easily fabricated, and is so very frequently employed under suspicious circumstances, that it is often talked of with a kind of contempt, as the 'setting up of an alibi.'

ALICANTE, a province of Spain, the most southern part of Valencia; area, 2098 square miles. The surface presents a remarkable alternation of inhospitable sun-burned wastes, with districts of the most luxuriant fertility, which produce abundance of southern fruits, wine, oil, maize, wheat, &c. Salt-mines and salt lakes are numerous. The wine culture of Alicante dates from the time of Charles V., who procured vine-stocks from the Rhine for this district. The wine is of a dark colour (hence called *vino tinto*, *tinto* in Spanish signifying deep-coloured), and is heavy and sweet. Pop. in 1897, 451,174.

ALICANTE, a town and seaport in Spain, capital of the province of the same name, picturesquely situated partly on the slope of a hill about 900 feet high, partly on the plain at the foot, 91 miles south by west of Valencia. It is surrounded by a strong wall, and is besides protected by a citadel that commands the harbour, and by several forts, and possesses an excellent roadstead sheltered by two capes forming a bay in front of the town. Both in its trade and manufactures it is one of the most thriving towns of Spain. The principal manufactures are cotton, linen, and cigars, one cigar manufactory employing above 3000 women. The chief export is wine, the value in some years being more than £1,000,000; lead is also an export. Alicante is an ancient town, and was first known by the name of Alona. In 718 it was taken by the Moors, from whom it was wrested by Ferdinand III. of Castile about 1240. By Castile it was afterwards ceded to Arragon. In modern times it has been several times besieged and bombarded as by the French under Asfeld in 1709, and under Suchet in 1812, and by the people of Cartagena during the commotions of 1873. Pop. in 1897, 49,463.

ALICATA, or LICATA, a seaport town in Sicily, at the mouth of the Salso, in the province of Girgenti, and 24 miles E.S.E. of the town of Girgenti, situated on the slope of a rocky hill, and defended by two forts. Its port is shallow, and cannot be entered by large vessels, which generally anchor about a mile south-west of the town, where they load. It has, however, a considerable trade in sulphur and grain, as well as in maccaroni, pistachio-nuts, almonds, and soda. Alicata was set on fire and almost destroyed by a French and Turkish fleet in 1553. Pop. (1901), 22,931.

ALIENS. In regard to each country an alien may be defined to be a person born out of the juris-

diction of the country, and not having acquired the rights of a citizen of it by naturalization. This definition, however, is not universally applicable; for children born out of the dominions of Great Britain, whose grandfathers by the father's side, or whose fathers, were natural-born subjects, are entitled to the rights of native citizens, unless at the time of their birth their fathers were in the service of an enemy. Aliens owe a local allegiance, and are bound equally with natives to obey all general rules for the preservation of order which do not relate specially to citizens. Even alien enemies may sue and be sued as in time of peace. In ancient Athens foreigners were not allowed to make a will, and at their death the state took possession of their property. The same was the case in Rome in the time of the republic; but under the empire aliens could both devise by will and inherit property. Aliens were generally looked upon with great jealousy during the middle ages, and the inhospitable rule of the *droit d'aubaine* was commonly in force. This law, which claimed for the benefit of the state the effects of deceased foreigners leaving no heirs who were natives, existed in France till 1791, when it was abolished by the first constituent assembly. The Code Napoléon revived the harsh doctrine of the *droit d'aubaine*, with the single exception that aliens should be entitled to enjoy in France the same civil rights as were secured to Frenchmen, *by treaty*, in the country to which the alien belonged. This law, however, having been repealed in 1819, no longer disgraces the French statute-book. Aliens have been repeatedly the objects of legislation in Great Britain. The principal statute on the subject of Naturalization is the Act of 1870 (33 and 34 Victoria, cap. xiv.), with which is construed the Naturalization Oath Act (33 and 34 Victoria, cap. cii.), and Act 35 and 36 Victoria, cap. xxxix. According to it real and personal property of every discription may be acquired, held, and disposed of by an alien, in the same manner in all respects as by a natural-born British subject; and a title to real and personal property of every description may be derived through, from, or in succession to an alien, in the same manner as if he were a natural-born British subject. No right is hereby conferred on an alien to hold real property situated out of the United Kingdom, nor is an alien hereby qualified for any office or franchise. No other right or privilege is by this act conferred on an alien except such as are expressly given in respect of property. Previously to this act the 7th and 8th Victoria, cap. lxvi. (1844), had allowed aliens to take and hold every species of personal property—but not real property—as fully and effectually as if they were natural-born subjects, and had enacted also that lands, houses, or other tenements for the purpose of residence, or for the carrying on of any trade, business, or manufacture, might be taken and held by aliens for any term of years not exceeding twenty-one. The children of aliens born in this country are natural-born subjects, and alien women married to natural-born subjects are naturalized. Formerly the only mode of naturalization was by act of Parliament; but by the last-mentioned statute it was provided that the secretary of state for the home department might, if he thought fit, grant a certificate of naturalization to any alien applying for it, on receiving evidence (with regard to his intention to remain in the country, his trade, &c.) as might seem to him necessary. This certificate conveyed to the alien all the rights and privileges of natural-born British subjects, except the right to became a member of Parliament or a privy-councillor. These rights have also been granted by the recent statute (that of 1870). The provisions contained in it are, that an alien resident in the United Kingdom for a term of not less than five years, or who has been in the service of the crown for not less than five years, and intends to reside in the kingdom, or to serve the British crown, may apply to the secretary of state for a certificate of naturalization, and on giving evidence of particulars may obtain it. An alien having obtained such a certificate, shall, in the United Kingdom, be entitled to all political and other rights, powers, and privileges, and be subject to all obligations to which a natural-born British subject is entitled or subject in the kingdom. When within the limits of the foreign state of which he was a subject prior to the certificate, he shall not be deemed a British subject unless he has ceased to be a subject of the other state. This statute does not affect the obtaining of *letters of denization* from the sovereign, by which the alien becomes a *denizen*, and occupies a kind of middle state between that of an alien and a natural-born subject. The denizen may purchase lands or receive them by devise, which, before the passing of the Naturalization Act, an alien could not. He cannot be of the privy-council, or either house of Parliament, or hold any office of trust either civil or military. It used to be a principle in English law, that a natural-born subject could not divest himself of his allegiance by becoming naturalized in a foreign state. Such a person was not looked upon as an alien, but as still a subject of this country; and consequently if a war broke out between England and the country in which he had become naturalized, he was a traitor if he took part on either side. The act of 1870 altered this state of matters, however, so that a British subject who has voluntarily become naturalized in a foreign state thereby ceases to be a British subject. A foreigner who has been naturalized as a British subject, may divest himself of the status so acquired by making a declaration of alienage before a justice of peace. So, also, any person who is a natural-born British subject (a foreigner born in England for example), but who at the time of his birth was by the law of any foreign state a subject of such state, may, if of full age, make a declaration of alienage, and cease to be a British subject. Any natural-born British subject who has become an alien may apply for a certificate of readmission to British nationality, on the same terms as those provided for aliens in general. Aliens are no longer tried by a jury consisting half of aliens. By the Aliens Act of 1905 alien immigrants of the steerage class of passengers may be prohibited from landing if arriving in a ship carrying more than twenty alien steerage passengers. Aliens can also be expelled.

ALIGARH, or ALIGHUR, a town in India, in the United Provinces, in the executive district of the same name, 53 miles north of Agra. Aligarh is a fortress, the town being Coel, distant about 2 miles, and connected with Aligarh by a beautiful avenue. It was anciently a place of importance, being mentioned as such by Abul Fazl in the Ayini-Akbari, and was more recently one of Dowlet Rao Sindia's principal depôts for military stores. The fort is square, with round bastions, a ditch, and glacis, and a single entrance, protected by a strong ravelin. It was taken in 1803 by Lord Lake, Sindia's commander Perron (a Frenchman) having previously surrendered, and the whole district was then added to the British Possessions. Since that time the fort has been much improved, and the town made the station of a civil and judicial establishment. Pop. of Coel, in 1901, 70,434. The district has an area of 1954 square miles, and a pop. of 1,021,187.

ALIGNMENT, a military term signifying the act of adjusting to a straight line, or the state of being so adjusted.

ALIMENT, a term which includes everything serving as nutriment for organized beings. In animals and vegetables we can observe the phenomena of decomposition and reproduction, and analyze the substances that administer to their growth and repair distinctly. Generally, however, the word aliment is used for what serves as nutriment to animal life. It is in this respect a subject of great interest for the zoologist. In the present article we shall confine ourselves chiefly to the aliment of mankind.—Man, it is well known, derives nourishment both from animal and vegetable substances. He eats fruits, both ripe and unripe, roots, leaves, flowers, and even the pith and the bark of different plants, many different parts of animals, and the whole of some. Climate, custom, religion, the different degrees of want and of civilization, give rise to an innumerable diversity of food and drink, from the repast of the cannibal savage to that of the Parisian epicure at the table of Very. Some nations abhor what others relish, and great want often renders acceptable what, under other circumstances, would have excited the greatest disgust. The flesh of dogs is commonly eaten in China. Locusts are eaten both in Asia and Africa, and the negroes on the coast of Guinea relish lizards, mice, rats, snakes, caterpillars, and other reptiles and worms. The Otomacs, a tribe of American Indians, are said by Humboldt to collect a kind of clay to eat in the rainy season.

All kinds of aliment must contain nutritious substance, which, being extracted by the act of digestion, enters the blood, and effects by assimilation the repair of the body. (See NUTRITION.) Alimentary matter, therefore, must be similar to animal substance, or transmutable into such. In this respect alimentary substances differ from medicines, because the latter retain their peculiar qualities in spite of the organs of digestion, and will not assimilate with the animal substance, but act as foreign substances, serving to excite the activity of particular organs or systems of the body. All alimentary substances must, therefore, be composed in a greater or less degree of soluble parts, which easily lose their peculiar qualities in the process of digestion, and correspond to the elements of the body. The aliments of animals are for the most part substances containing little oxygen and exhibiting a high degree of chemical combination, in which respects they differ from most substances that serve as sustenance for plants, which are generally highly oxidized and exhibit little chemical combination. According to the nature of their constituents most of the aliments of animals are divided into nitrogenous (consisting of carbon, hydrogen, and oxygen along with nitrogen, and also of sulphur and phosphorus), and anitrogenous (consisting of carbon, hydrogen, and oxygen without nitrogen). Water and salts are usually considered as forming a third group, and, in the widest sense of the word aliment, oxygen alone, which enters the blood in the lungs, forms a fourth. The articles used as food by man do not consist entirely of nutritious substances, but with few exceptions are compounds of various nutritious with indigestible and accordingly innutritious substances. The only nitrogenous aliments are albuminous substances, and these are contained chiefly in animal food (flesh, eggs, milk, cheese). The principal anitrogenous substance obtained as food from animals is fat. Sugar is so obtained in smaller quantities (in milk and eggs). Very few vegetable substances contain much albumen, while they are generally rich in starch. Among vegetable substances the richest in albumen are the legumes and wheat-flour, which contain a good deal of gluten. Fats, sugar, water, and salts may pass without any change into the circulatory system; but albuminous substances cannot do so without being first rendered soluble and capable of absorption (in the stomach and intestines), and starch must be converted into sugar (by the action of the saliva and pancreatic juice). One of the objects of cooking is to make our food more susceptible of the operation of the masticatory and digestive fluids.

The relative importance of the various nutritious substances that are taken into the system and enter the blood depends upon their chemical constitution. The albuminous substances are the most indispensable, inasmuch as they form the material by which the constant waste of the body is repaired, whence they are called by Liebig the substance-formers. But a part of the operation of albuminous nutriment may be performed equally well, and at less cost, by anitrogenous substances, that part being the maintenance of the temperature of the body. As is well known, the temperature of warm-blooded animals is considerably higher than the ordinary temperature of the surrounding air, in man about 98° Fahr., and the uniformity of this temperature is maintained by the heat which is set free by the chemical processes (of oxidation) which go on within the body. Now these processes take place as well with anitrogenous as with nitrogenous substances. The former are even preferable to the latter for the keeping up of these processes, inasmuch as they do not require to be digested before fulfilling that function, and they are hence called the heat-givers. The best heat-giver is fat. Albuminous matters are not only the substance-formers of the body; they also supply the vehicle for the oxygen, inasmuch as it is of such matters that the blood corpuscles are formed. The more red blood corpuscles an animal possesses, the more oxygen can it take into its system, and the more easily and rapidly can it carry on the process of oxidation and develop heat. Now only a part of the heat so developed passes away into the environment of the animal; another part is transformed within the body (in the muscles) into mechanical work. Hence it follows that the anitrogenous articles of food produce not merely heat but also work, but only with the assistance of albuminous matters, which, on the one hand, compose the working machine, and on the other hand, convey the oxygen necessary for oxidation.

Organs of digestion in a healthy state dissolve alimentary substances more easily, and take up the nutritious portions more abundantly, than those of which the strength has been impaired, so that they cannot resist the tendency of each substance to its peculiar chemical decomposition. The wholesome or unwholesome character of any aliment depends, therefore, in a great measure, on the state of the digestive organs in any given case. Sometimes a particular kind of food is called wholesome because it produces a beneficial effect of a particular character on the system of an individual. In this case, however, it is to be considered as a medicine, and can be called wholesome only for those whose systems are in the same condition. Very often a simple aliment is made indigestible by artificial cookery. The addition of too much spice makes many an innocent aliment injurious, because spices resist the action of the digestive organs, and produce an irritation of particular parts of the system. They were introduced as artificial stimulants of appetite. In any given case the digestive power of the individual is to be considered in order to determine whether a particular aliment is wholesome or not. In general, therefore, we can only say that that aliment is healthy which is easily soluble, and is suited to the power of digestion of the individual; and in order to render the aliment perfect, the nutritious parts must

be mixed up with a certain quantity of innocent substance affording no nourishment, to fill the stomach, because there is no doubt that many people injure their health by taking too much nutritious food. In this case the nutritious parts which cannot be dissolved act precisely like food which is in itself indigestible. (See DIGESTION.) Man is fitted to derive nourishment both from animal and vegetable aliment, but can live exclusively on either. Animal food most readily augments the solid parts of the blood, the fibrin, and therefore the strength of the muscular system, but disposes the body at the same time to inflammatory, putrid, and scorbutic diseases. On the contrary, vegetable food renders the blood lighter and more liquid, but forms weak fibres, and disposes the system to the diseases which spring from feebleness. The nations of the North incline generally more to animal aliments; those of the South, and the orientals, more to vegetable. These latter are generally simpler in their diet than the former, when their taste has not been corrupted by luxurious indulgence. Some tribes in the East, and the caste of Brahmans in India, live entirely on vegetable food. The inhabitants of the most northern regions live almost entirely upon animal food, and very largely on fat on account of its heat-giving property. They scarcely ever partake of any vegetable substance, at least during the greater part of the year. See ADULTERATION and DIETETICS.

ALIMENTARY CANAL, a common name given to the œsophagus, stomach, and intestines of animals. See ŒSOPHAGUS, INTESTINE, and STOMACH.

ALIMONY, in law, the allowance to which a woman is entitled while a matrimonial suit is pending between her and her husband, or after a legal separation from her husband, not occasioned by adultery or elopement on her part. The allowance in the latter case may be either a gross or an annual sum, and the court may order it to be paid either to the woman herself or a trustee.

ALIQUOT PART is such part of a number as will divide and measure it exactly without any remainder. For instance, 2 is an aliquot part of 4, 3 of 12, and 4 of 20.

ALISMACEÆ, the water-plantain family, a natural order of endogenous plants, the members of which are herbaceous, annual or perennial; with petiolate leaves sheathing at the base, hermaphrodite (rarely unisexual) flowers, disposed in spikes, panicles, or racemes. They are floating or marsh plants, and many have edible fleshy rhizomes. They are found in all countries, but especially in Europe and North America, where their rather brilliant flowers adorn the pools and streams. The principal genera are *Alisma* (water-plantain) and *Sagittaria* (arrow-grass).

ALISON, ARCHIBALD, a theologian and æsthetical writer, born at Edinburgh in 1757; died there May 17, 1839. He studied first at Glasgow, where he obtained an exhibition to Balliol College, Oxford. He afterwards entered the English Church, obtained livings in it to the value of about £800, and finally (1800) settled as the minister of an Episcopal chapel at Edinburgh, where he lived in the intimacy of its most distinguished literary characters, and was much admired as a preacher. He is known chiefly as the author of two volumes of sermons, remarkable for the elegance of their style, and a work entitled Essays on the Nature and Principles of Taste (1790), which was little known till a laudatory article in the Edinburgh Review brought it into notice. In these essays he (in the words of Jeffrey) 'maintains that all beauty, or, at least, that all the beauty of material objects, depends upon the associations that may have connected them with the ordinary affections of our nature.'

ALISON, SIR ARCHIBALD, a man of eminence as a lawyer and an author, was born at Kenley in Shropshire, December 29, 1792, and died of bronchitis, May 23, 1867, at his seat of Possil House, near Glasgow. He was the second son of the Rev. Archibald Alison (see preceding article), and his wife Dorothea, daughter of Professor Gregory of Edinburgh. His father having in 1800 accepted the pastorate of the Cowgate Episcopal church, Alison became a student of the University of Edinburgh, and carried off the highest honours in Greek and mathematics. In 1814 he was admitted to the Scottish bar, but spent the next eight years in continental travel, and was an eye-witness of many of the exciting events which he has described. On his return he was appointed advocate-depute, which post he held till 1830. During this period he was constantly amassing and arranging the materials for his Principles of the Criminal Law of Scotland, which appeared at Edinburgh in 1832, and is a standard authority both at home and abroad. In 1833 he issued a supplement to this work—The Practice of the Criminal Law. He was appointed sheriff of Lanarkshire in 1834; in 1845 he was elected Lord-rector of Marischal College, Aberdeen, and in 1851 a like honour was conferred upon him by the students of the University of Glasgow. The Derby administration conferred a baronetcy upon him in 1852, and in the following year he received the title of D.C.L. from Oxford. His *magnum opus*—The History of Europe from 1789 to 1815 was first issued in ten vols. 1833–42. He subsequently brought down the narrative to 1852, the date of the birth of the second French Empire. This work displays great industry and research, is generally candid and accurate, but is open to the charge at once of prolixity and dryness. Its popularity, however, has been immense, as it filled a void in our historical literature, and edition after edition was called for both in Britain and America; and it was translated into French, German, Arabic, Hindustani, &c. Among Sir Archibald Alison's other productions are—Principles of Population in Relation to the Welfare of Humanity; Free-trade and Protection; England in 1815 and 1845; Life of the Duke of Marlborough; Life of Lord Castlereagh, and an Autobiography published in 1883.—For his son, SIR ARCHIBALD., see SUPP.

ALIWAL, a village in the Punjab on the Sutlej, celebrated from a great battle fought in its vicinity, January 28, 1846, between the Sikhs and a British army, the former commanded by Sirdar Runjeet Sing, and the latter by Sir Harry Smith. The Sikh force—over 20,000 men—was double the number of the British, and their artillery was in the same proportion. The battle lasted from 10 A.M. to 1 P.M., and ended in the total defeat of the Sikhs, who lost between 5000 and 6000 men, and all their artillery.

ALIWAL NORTH, a town in the east of Cape Colony, on the south bank of the Orange River, here crossed by a fine bridge, the Frere Bridge. It stands at the height of 4350 feet above the sea, and is a well-built place, with churches, hotels, golf links, &c. The warm sulphur springs, and the suitability of the climate for consumptives, attract many visitors. Pop. (1904), 5557.

ALIZARINE, a substance contained in the madder root, and largely used in dyeing reds of various shades. Formerly madder-root was largely employed as a dye-stuff, its capability of dyeing being chiefly due to the presence in it of alizarine; but of late years the use of the root has been almost superseded by the employment of alizarine itself, prepared artificially from one of the constituents of coal-tar. Among the heavier portions of coal-tar a solid body is found called anthracene (which see)

This substance is a hydrocarbon, having the formula $C_{14}H_{10}$; by oxidation it yields a body called anthraquinone, $C_{14}H_8O_2$, which can be converted into dibromanthraquinone, $C_{14}H_6Br_2O_2$. By heating dibromanthraquinone with an alkali bromine is replaced by the group (O H) and alizarine ($C_{14}H_8O_4$) is produced. Other processes are also in use for the conversion of anthracene into alizarine.

Alizarine forms yellowish-red prismatic crystals, which may be sublimed without decomposition. It is nearly insoluble in cold, but is dissolved to a small extent by boiling water; it is readily soluble in alcohol and ether. Alizarine is possessed of exceedingly strong tinctorial powers.

The following numbers, representing the average annual imports of madder before 1868, and the imports in 1875 and 1897, after the discovery of artificial alizarine, show the rapid decline of the madder trade, which is now practically extinct.

	1859–68.	1875.	1897.
Tons of madder imported.....	15,292..	5014..	189.

ALKALI. This name was originally applied to the soluble part of the ashes of certain plants, especially of sea-weeds. It is probably derived from the Arabian *kali*, the name of a plant the ashes of which were generally employed in the manufacture of this substance. When plant ashes are extracted with water, and the liquid is evaporated, a residue is obtained which effervesces when added to an acid. For long this property of effervescence with acids was regarded as distinctive of alkali, no attempt being made to distinguish between substances having this property in common. In the eighteenth century it was shown that several distinct substances exhibited this property, and from this time dates the division of alkali into vegetable, mineral, and volatile alkali, or, as we now call them, potash, soda, and ammonia. It was not, however, until 1755 that the term alkali was strictly defined, and the essential differences between substances hitherto supposed to be the same pointed out. It is to Dr. Joseph Black that we owe this introduction of precision into the chemical knowledge which existed in a scarce defined form. It was by the careful employment of quantitative research that Black established the essential characteristics of an alkali. Black found that when a given weight of *magnesia alba* (unburned magnesia) is strongly heated it decreases in weight, and that the residue no longer effervesces when added to an acid, but dissolves quietly in the acid. He found further that if to that solution of *magnesia usta* (burned magnesia) in acid a quantity of carbonate of potash (then known as *mild alkali*) be added, a precipitate is formed, and that the weight of this precipitate is exactly the same as that of the magnesia alba originally employed. Further, he found that this precipitate possesses all the properties of magnesia alba; hence he concluded that in the burning of magnesia alba something is given off which may be restored by acting on the burned magnesia by mild alkali, and that it is this something which bestows on the magnesia alba its property of effervescing with acids. Black also noticed that magnesia usta was possessed of marked caustic properties which it did not share with unburned magnesia. Following from the results of this inquiry, a definition has been adopted for the term alkali so as to include substances having the following general properties:—1, Solubility in water; 2, power of completely neutralizing all acids; 3, possession of caustic or corroding action on vegetable and animal substances when in aqueous solution; 4, power of changing the colour of many vegetable substances; 5, power of precipitating the heavy metals from most of their acid solutions in the form of hydrates or oxides.

Certain substances which possess some of these properties in a slight degree are termed *alkaline earths*. The principal of these are lime, baryta, and strontia. The alkalies proper are potash, soda, lithia, and ammonia.

ALKALIMETER, an instrument for ascertaining the quantity of free alkali in any impure specimen, as in the potashes of commerce. These, besides the carbonate of potash, of which they principally consist, usually contain a portion of foreign salts, as sulphate and chloride of potassium, and as the true worth of the substance, or price for which it ought to sell, depends entirely on the quantity of carbonate, it is of importance to be able to measure it accurately by some easy process. This process depends on the neutralization of the alkali by an acid of known strength, the point of neutralization being determined by the fact that neutral liquids are without action on either red or blue litmus solution. The alkalimeter is merely a graduated tube furnished with a stop-cock at the lower extremity, from which the standard acid is dropped into the alkaline liquid. A process of neutralization, exactly the same in principle, may be employed to test the strength of acids.

ALKALOIDS. In the early part of the nineteenth century a substance was discovered in opium, an alcoholic solution of which possessed certain of those properties regarded as characteristics of alkalies. Thus, vegetable colours were acted upon by the alcoholic liquid in a manner somewhat similar to that in which they were affected by alkalies. Acids were neutralized by this liquid with the formation of definite salts, &c. The substance thus obtained was called an *alkaloid* (like an alkali). From time to time other substances of a somewhat similar nature were discovered in various plants, and these were all grouped together under the class of alkaloids. We now know of very many of those substances; some of them have been produced artificially, others have only as yet been prepared from plants. The properties of these substances present a gradation from those which distinguish the true alkalies to others which are far removed therefrom. The one property possessed by all in common is the power of combining directly with acids to form salts which are crystalline, and generally soluble in water. The alkaloids generally, but not invariably, contain nitrogen. They may usually—so far as we know anything of their true composition—be regarded as substances built up on the type of ammonia, in which the hydrogen is partly or altogether replaced by radicles containing carbon and hydrogen, or carbon, hydrogen, and oxygen.

ALKANET, a dyeing drug, the bark of the root of the *Anchusa* or *Alkanna tinctoria*, a plant belonging to the natural order Boraginaceæ, with downy and spear-shaped leaves, and clusters of small purple or reddish flowers. This plant is sometimes cultivated in Britain, but by far the greater portion of the alkanet here used is imported either from the Levant or from the neighbourhood of Montpellier in France. Alkanet imparts a fine deep-red colour to all unctuous substances and to spirit of wine; but it tinges water with a dull brownish hue. Its chief use is for the colouring of oils, plasters, lip-salve, confections, &c. It is likewise employed in compositions for rubbing and giving colour to mahogany furniture. Wax tinged with alkanet, and applied to the surface of warm marble, stains it flesh-colour, and sinks deep into the stone. It is also used to colour spurious port-wine.

ALKERMES, the name of a very agreeable but highly intoxicating table liquor, which is prepared and in common use at Naples. It is of a fine red colour, which it derives from the *kermes*, an insect

found in great abundance on a species of evergreen oak (*Quercus coccifera*) which grows in many parts of Europe. The liquor is the product of the distillation of an infusion of bay leaves, mace, nutmeg, cinnamon, and cloves, to which are added sugar and the colouring matter after the distillation.

ALKMAAR, a town of the Netherlands, in the province of North Holland, on the North Holland canal, and 20 miles N.N.W. of Amsterdam. It is regularly built, and has been much improved in appearance by the conversion of its ramparts into elegant public walks. Its finest public buildings are the church of St. Lawrence and a richly decorated Gothic town-house. It has manufactures of salt, sailcloth, &c., and an extensive trade in cattle, corn, butter, and cheese, for the last of which it is one of the largest markets in Europe. The most interesting events in its history are its successful defence against the Duke of Alva in 1573, and the invention of damask-weaving by a native citizen, Paschier Lammertyn, in 1595. About 2½ miles to the west lay the castle of the counts of Egmont, destroyed by the Spaniards. Pop. (1910), 20,964.

ALKORAN. See KORAN.

ALLA BREVE is the proper designation of the time of a piece of music in which the breve is equal to a semibreve in ¾ time, and is to be played in a movement of twice the usual rapidity; so that a breve is played as fast as a semibreve, a semibreve as fast as a minim, and so on. It is usual, in this mode of time, to prefix to the piece a designation that resembles a C with a perpendicular line through it, but is intended to represent a circle bisected; sometimes also a ^{2}, or large 2 or ¾. It is, however, distinct from two-minim time, which is also often called *alla breve* time. Besides, the expression *alla capella* is sometimes used; by which phrase is meant, that though the notes in their proportional magnitude are the same as in the ancient psalm-tune, yet they are not to be given in the choral style as sung by the congregation, but more lively, as in the chapel style.

ALLAH, in Arabic, the name of God, the creator of all nature, of whom Mohammed says he is the only being who derives his existence from himself, and has no equal. He is lord of the universe; and Mohammed inculcates obedience to him as the one true God, the Author of his religion. The word is compounded of the article *al*, and the word *Elah*, which signifies 'the Adored' and 'the Adorable,' and is synonymous with the singular of the Hebrew word *Elohim*. *Allah Akbar* (God is great) is a Mohammedan war-cry.

ALLAHABAD, an ancient city of India, capital of a division and district of the same name, as well as of the whole of the United Provinces, 70 miles west of Benares. The native town consists largely of mud houses. An English suburb named Canningtown, which is now rapidly rising, has, of course, much more of a European aspect. Among the remarkable buildings of Allahabad are a large triangular fort, occupying a point of land formed by the junction of the Ganges and Jamna, and containing the remains of an ancient palace, and now also the the barracks, &c.; the mausoleum and garden of Khosru, the tomb being a handsome domed building, and two other mausoleums; the government offices and courts; All Saints' Church; the Roman Catholic cathedral; the Muir Central College founded in 1874, the chief educational establishment of the North-west Provinces; the Mayo Memorial and town-hall. Allahabad is one of the chief resorts of Hindu pilgrims, who come partly to visit a sacred cave under the Chali Satum temple (whence it is said there is a subterranean passage to Benares, 70 miles distant), but chiefly to have their sins washed away by bathing in the waters of the sacred rivers Ganges and Jamna at their junction, where believers see a third river, the Saraswati (which is in reality lost in the sands at a distance of 400 miles from Allahabad), mingle its current with those of the other two. A great fair is held on the 14th of December, and is much attended by pilgrims. There are hardly any manufactures. Allahabad forms a junction in the railway system between Bengal and Central India, and its trade has of late years revived, and is rapidly increasing. In the mutiny of 1857 it was the scene of a serious outbreak and massacre. Pop. in 1901, including cantonments, &c., 172,032.—The division of Allahabad contains the districts of Cawnpur, Futtehpur, Hamirpur, Banda, Jhansi, Jalaun, Lalitpur, and Allahabad. The area is 17,265 square miles. The agriculture of the division is greatly promoted by a canal 310 miles long, connecting the Ganges and the Jamna. Pop. (1901), 5,535,803.—The district contains an area of 2852 square miles. About five-sixths of the surface is under cultivation, the principal crops being rice, pulse, wheat, tobacco, &c. Pop. (1901), 1,487,904.

ALLAN, DAVID, a Scottish historical painter, was born at Alloa, February 13, 1744. Some early efforts of his genius having attracted attention, he was sent in 1755 to the Messrs. Foulis's academy of painting and engraving in Glasgow, where he remained seven years. In 1764 the liberality of some friends enabled him to visit Italy, where he passed sixteen years in pursuing his studies, and copying the remains of antiquity and the old masters. While at Rome, in 1773, he received a gold medal, given by the Society of St. Luke for the best specimen of historical composition. On his return from Italy he resided for two years in London (1777–79), but finally established himself at Edinburgh, where he succeeded Runciman as master of the Trustees' Academy, and died August 6, 1796. His illustrations of the Gentle Shepherd, the Cotter's Saturday Night, and other sketches of rustic life and manners in Scotland, in aquatinta, obtained for him the name of the 'Scottish Hogarth.' His principal painting is the Return of the Prodigal Son. The subject of his prize composition, which is much admired, is the Origin of Painting. His principal talent lay in droll or humorous expression.

ALLAN, SIR WILLIAM, a distinguished Scottish artist, born at Edinburgh in 1782. After attending the High School he was placed for some time with a coach-painter, and in this capacity he exhibited so much talent that he was received into the Trustees' Academy, where he had Wilkie as his fellow-student. He afterwards proceeded to London and became a student of the Royal Academy. His first pictures attracted little attention, and Allan, resolving to try his fortune abroad, proceeded to St. Petersburg, where he remained for nearly ten years, making occasional excursions to distant parts of Russia, and journeying even as far as Tartary and the shores of the Black Sea. In 1814 he returned to Scotland, and publicly exhibited his numerous sketches and several finished pictures of the scenery and costume of these distant regions. From their novelty and high style of art they attracted much attention, and at the suggestion of Sir Walter Scott one of the large pictures (Circassian Captives) was purchased by 100 gentlemen, who subscribed ten guineas each; the subscribers then drew lots for it, and it fell to the Earl of Wemyss. From this time Allan's reputation was made. He could now dispense with the adventitious aid of foreign travel, and turning his attention to the annals of his native country he produced these historical pieces by which he is best known: Knox admonishing Mary Queen

of Scots, Murder of the Regent Murray, Murder of Archbishop Sharp, Parting of Prince Charles Stuart and Flora Macdonald, &c. Latterly he attempted battle scenes, in which he was also very successful; as the Battle of Prestonpans, Nelson boarding the San Nicolas, and two pictures of the battle of Waterloo, one of which was purchased by the Duke of Wellington. In the meantime he had gradually risen to the highest distinctions in his profession. In 1835 he became R.A., in 1838 president of the Scottish Academy, in 1841 he succeeded Wilkie as her majesty's limner for Scotland, and in 1842 he was knighted. He died in 1850.

ALLEGHANY, a river which rises in Potter county, Pennsylvania, winds through the south-west part of New York state, turns again into Pennsylvania, lows south-west, and unites with the Monongahela at Pittsburg to form the Ohio. It is navigable for small steamers for nearly 200 miles above Pittsburg.

ALLEGHANY, or ALLEGHENY, a city of the United States, Pennsylvania, situated on the river Alleghany, opposite Pittsburg, of which it may be considered a suburb, and with which it is connected by six bridges. The principal industries are concerned with iron and machinery. Pop. (1900), 129,896.

ALLEGHANY (or APPALACHIAN) MOUNTAINS, an extensive mountain system in the United States of America. Commencing in the northern parts of Alabama and Georgia, it traverses the states of Tennessee, North Carolina, Virginia, Maryland, and Pennsylvania to New York, at a distance from the Atlantic (to which it runs nearly parallel) of 50 to 130 miles. It extends through 11° of lat., and is from 50 to 200 miles broad. The system consists of three well-marked parallel divisions, namely the Blue Ridge on the east, the Cumberland-Alleghany plateau on the west, and between these the broad Appalachian valley. Their mean elevation is about 2500 feet; but in Yancey County, North Carolina, some of the peaks, as Mounts Mitchell, Washington, and Roan, attain an elevation of over 6000 feet. North of the Appalachians proper are the mountains of New York and the north-eastern states, containing the Adirondacks and other groups. These are not characterized by the regular parallelism of the southern system. The Alleghany Mountains divide the waters that flow into the Atlantic from those that fall into the Mississippi. They are composed mainly of granite, gneiss, mica and clay-slate, and primary limestone, and are generally clothed with a luxuriant vegetation; their west slope is considered one of the finest countries in the United States. The scenery is picturesque. The vegetation is different on the two sides; the locust-tree, Canadian poplar, hibiscus, and hydrangea are most common on the west side; the American chestnut and kalmias are so numerous on the Atlantic side as to give a distinctive character to the flora.

ALLEGIANCE (connected with *liege*), according to Blackstone, is 'the tie or *ligamen* which binds the subject to the sovereign in return for that protection which the sovereign affords the subject', or, generally, the obedience which every subject or citizen owes to the government of his country. It used to be the doctrine of the English law that natural-born subjects owe an allegiance which is intrinsic and perpetual, and of which they cannot be divested by any act of their own; but this is no longer the case. (See ALIENS.) Aliens owe a temporary allegiance to the sovereign of Great Britain so long as they reside in British territory. A usurper in undisturbed possession of the crown is entitled to allegiance; and thus treasons against Henry VI. were punished in the reign of Edward IV., though the former had, by act of Parliament, been declared a usurper. See OATH.

ALLEGORY (from Greek *allo*, something else, and *agoreuein*, to speak), a figurative representation, in which the signs (words or forms) signify something besides their literal or direct meaning, each meaning being complete in itself. In rhetoric allegory is often but a continued simile. Parables and fables are a species of allegory, for example, the beautiful parable in one of the tales in the Arabian Nights, in which the three religions, the Mohammedan, Jewish, and Christian, are compared to three similar rings, bequeathed to three brothers by their father. Sometimes whole works are allegorical, as Reynard the Fox, Spenser's Faerie Queene, and Bunyan's Pilgrim's Progress. When an allegory is thus continued through long works it is indispensable to its success that not only the allegorical meaning should be appropriate, but that the story should have an interest of its own in the direct meaning apart from the allegorical signification. There was a time when every poem was taken as an allegory; even such works as those of Ariosto and Tasso were tortured from their true meaning and made to pass for allegorical pictures. No poet has made use of allegory in a more powerful and truly poetical manner than the great Dante. Allegory is often made use of in painting and sculpture as well as in literature.

ALLEGRI, GREGORIO, an Italian composer and a singer in the papal chapel, considered one of the most excellent composers of his time, was born at Rome about 1580 (according to others 1590), and died there in 1652. His Miserere has particularly distinguished him. It is even now regularly sung during passion-week in the Sistine Chapel at Rome. Its subject is the fifty-seventh psalm (which in the Latin version begins with the word *miserere*), and is composed for two choruses in five and in four part harmony. This composition was once esteemed so holy that whoever ventured to transcribe it was liable to excommunication. In 1770 Mozart, then only fourteen years of age, disregarded this prohibition, and after two hearings made a correct copy of the original. In 1771 it appeared at London, engraved under Dr. Burney's superintendence. Soon after (in 1773) Pope Clement XIII. presented the King of England with a copy of the original.

ALLEGRO, an Italian word signifying gay, and used in music to express a more or less quick rate of movement. The degrees of quickness are indicated by additional qualifying words or by derivatives of the word *allegro*. Thus *allegretto* or *poco allegro* means rather lively; *allegro moderato*, *commodo*, *giusto*, moderately quick; *allegro maestoso*, quick but with dignity; *allegro assai* and *allegro molto*, very quick; *allegro con brio* or *con fuoco*, with fire and energy; *allegrissimo*, with the utmost rapidity. *Più allegro* is a direction to play or sing a little quicker. *Presto* indicates a still quicker rate than *allegro*, but there is usually also this difference between the *presto* and *allegro* movements, that the former demands nothing more than rapid execution, while the latter require to be performed with expression as well as quickness. The first movement of a symphony and other similar compositions is called the *allegro*.

ALLEINE, JOSEPH, the author of An Alarm to Unconverted Sinners, was born at Devizes in Wiltshire in 1634; educated at Oxford; became minister at Taunton in Somersetshire in 1655, from which benefice he was ejected for nonconformity in 1662. He was twice imprisoned for preaching after his ejectment. He died in November, 1668.

ALLEINE, RICHARD, a Nonconformist divine, born in 1611 at Ditcheat, in Somersetshire. He became in 1641 rector of Batcomb, in that county, where he discharged his clerical duties with great diligence. He was a zealous supporter of the Solemn League and

Covenant, and was employed as an assistant to the commissioners appointed by Parliament for ejecting scandalous ministers. At the Restoration he was deprived, by the Act of Uniformity, of his own living (1662); but he continued to preach privately in the house of a gentleman of distinction in the neighbourhood, who had been a member of Parliament. This, being contrary to the law, subjected him to a short imprisonment, and he was several times brought up before the magistrates to receive a reprimand for holding a conventicle; but he continued to persevere in the same course till his death in 1681. He wrote several devotional works, which have been frequently reprinted. The most celebrated is his Vindiciæ Pietatis, or a Vindication of Godliness in the Greatest Strictness and Spirituality.

ALLELUIA. See HALLELUIA.

ALLEN, BOG OF, the general name applied to a numerous series of bogs in Ireland, and not, as very generally supposed, to one continuous morass of great extent. They are dispersed, often widely apart, with extensive tracts of dry cultivated soil between, over a broad belt of land stretching across the centre of the country, from Wicklow Head to Galway on the south, and from Howth Head to Sligo on the north, having thus a breadth of about 27 miles at the east end and of 80 at the west extremity. The bogs, however, all lie on the east side of the Shannon, and are, for the most part, of that kind called red bog.

ALLEN, JOSEPH W., a landscape-painter, born in 1803, at Lambeth, Surrey, where his father was a schoolmaster. Intending to follow the same profession, Allen became an usher at Taunton, but manifesting a strong taste for art, he returned to London, in the hope of maintaining himself by his pencil. At first he was compelled to work in decorating signs and manufacturing showy paintings for picture-dealers. He then turned his attention to scene-painting for the theatres, and after being some time employed as assistant to Stanfield and others, he obtained the situation of principal scene-painter at the Olympic. His bold and brilliant style contributed much to the success of that establishment under the management of Madame Vestris; but although compelled to paint in this style for a livelihood, his *forte* lay in the truthful delineation of quiet pastoral scenery. His early oil-paintings were generally of small size, and though rendered with great delicacy, did not at first attract much attention at the annual exhibitions of the Royal Academy. He therefore joined the newly-founded Society of British Artists, of which he became a zealous supporter, and ultimately its secretary. In his later pictures he returned to the 'brilliant effects' in which he had acquired so much skill as a scene-painter, and although his landscapes became great favourites with the prize-holders of the Art-Union, they were inferior to his earlier productions in the higher qualities of the art. Allen died of disease of the heart, August 26, 1852.

ALLEN, THOMAS, an eminent mathematician, born at Uttoxeter, in Staffordshire, in 1542; died in 1632. He studied at Oxford, and became Fellow of Trinity College in 1565. The greater part of his life was passed in learned retirement at Gloucester Hall, where he died. He is author of several astrological treatises written in Latin. His skill in science made him in his own day to be generally reputed a dealer in the black art.

ALLENSTEIN, a town in East Prussia, in the government of Königsberg, and 65 miles south of the town of Königsberg, at the junction of the Neu Pisch with the Alle. It is the capital of a circle of the same name; and has a castle, and an infirmary and orphanage of the Sisters of Mercy; with a trade in linen, grain, and wood, and manufactures of iron and earthenware. There are glass-works in the neighbourhood. Pop. (1890), 19,236; (1905), 27,422.

ALLENTOWN, a town in the United States, Pennsylvania, capital of Lehigh county, on the river of this name, 18 miles above its junction with the Delaware, and on a railway which connects it on one hand with the anthracite coal-field of the Lehigh, and on the other with Philadelphia and New York. The chief trade is in coal and iron. For smelting the latter several large blast-furnaces are in operation. The inhabitants are chiefly of German descent, and Allentown is said to contain the first Lutheran church that was built in America. Pop (1900), 35,416.

ALLEYN, EDWARD, a celebrated actor in the reigns of Elizabeth and James I., better known as the founder of Dulwich College, born in London in 1566. He was part proprietor with Henslowe of the Rose on Bankside (1592), and afterwards (1600) of the Fortune in Cripplegate. According to the testimony of Ben Jonson and the other dramatists of the age he was the first actor of the day, and of course played leading characters in the plays of Shakspere and Jonson; although, in consequence of the names not being set against the parts in the old editions of those authors, his particular share in them is not ascertained. He was keeper of the royal bear-garden. Having become wealthy, he built Dulwich College, under the name of 'The college of God's gift,' in 1613–17. Aubrey tells a ridiculous story of the origin of this donation, in a fright experienced by Alleyn, who saw a real devil on the stage, while himself performing a fictitious one in a play. The college was established by royal patent in 1619. Alleyn was the first master of his own college, and, dying in 1626, was buried in the new chapel belonging to it. The college was reconstituted by act of Parliament in 1858, and new buildings have been erected. See DULWICH.

ALLIA, the name of a small affluent of the Tiber, joining it about 12 miles from Rome. It is famous for the disastrous defeat sustained on its banks by the Roman army from Brennus and his Gauls, resulting in the capture and sack of Rome by the latter, about 390 B.C. *Dies Alliensis* became proverbial with the Romans for an unlucky day.

ALLIACEOUS PLANTS, a term applied to a number of plants of the order Liliaceæ, belonging to the genus *Allium* (which see), that to which the onion, leek, garlic, shalot, &c. belong, or to other allied genera, and distinguished by a certain peculiar pungent smell and taste characterized as *alliaceous*. The alliaceous flavour is found in a few plants having no botanical affinities with the Liliaceæ, as in the *Alliaria officinalis*, or jack-by-the-hedge, a plant of the order Cruciferæ.

ALLIANCE, a league between two or more powers. Alliances are divided into offensive and defensive. The former are for the purpose of attacking a common enemy, and the latter for mutual defence. An alliance often unites both of these conditions. Offensive alliances, of course, are usually directed against some particular enemy; defensive alliances against any one from whom an attack may come.

ALLIANCE, HOLY. See HOLY ALLIANCE.

ALLIER, a department of France, surrounded by the departments of Cher, Nièvre, Sâone et Loire, Loire, Puy de Dôme, and Creuse. It is named after the river Allier, which flows through it in a north-westerly direction. The Cher enters it on the west, and the Loire skirts it on the north-east. Several chains of mountains, offsets of the Cevennes and other ranges, which form the basins of those rivers, enter the department, forming considerable heights, several being from 3000 to 4000 feet in the south, but generally lowering much towards the north. The

culminating point is the Puy de Montoncel, 4200 feet high, at the borders of the departments of Loire and Puy de Dôme. The hills in general form richly-wooded plateaux, rendering this one of the best wooded departments in France. The sides of the western ranges in particular contain extensive beds of coal; the other important minerals are marble, building-stones of various kinds, which are abundant, manganese, kaolin, clay for crucibles and pottery, and antimony. The department was till recently wholly agricultural, but the active working of minerals and the organization of related industries has made rapid progress during a recent series of years, and the two towns of Montluçon and Commentry are now flourishing centres of mining and manufacturing enterprise. The iron mines of Cher in the vicinity, with the coal of this department, have led to the establishment of considerable ironworks. The mineral waters of Vichy, Bourbon L'Archambault, and several other places in the department, are much valued. Between mining and metallurgy more than 10,000 hands are employed. The soil of the valleys is fertile; large numbers of sheep and cattle are bred, but agriculture is not in an advanced state. The area of the department is 2822 miles. The department contains 4 arrondissements—Montluçon, Moulins, Gannet, and La Palisse, 28 cantons, and 321 communes. The capital is Moulins. Pop. in 1886, 424,582; in 1896, 424,378; in 1901, 422,024.

ALLIGATION, a rule of arithmetic, chiefly found in the older manuals, and relating to the solution of questions concerning the mixing together of different ingredients, or ingredients of different qualities or values. Thus if a quantity of sugar worth 6*d.* the pound and another worth 3*d.* are mixed, the question to be solved by the rule of alligation is, What is the value of the mixture by the pound?

ALLIGATOR, the name of a large reptile belonging to the order Crocodilia, derived from a corruption of the Spanish *el lagarto*, that is the lizard, from the Latin *lacertus*, a lizard. These reptiles are confined to the rivers of the New World, in which they typically represent the crocodiles of the Eastern Hemisphere. The best known species are the *Alligator lucius*, or alligator of the Southern States of North America; the caiman of Surinam and Guiana (*A. palpebrosus*), and the spectacled alligator (*A. sclerops*), found in Brazil. The alligators have the hind legs rounded, and the feet only partially webbed. Owen defines this genus as that in which the fourth tooth of the lower jaw is larger than the others, and forms a canine, whilst this tooth is received into a pit in the palatal surface of the upper jaw, and is thus entirely concealed when the mouth is shut. In the water the full-grown alligator is a formidable animal, on account of its great size and strength. It grows to the length of 15 or 20 feet, is covered above by a dense armour of horny scales, impenetrable to a musket-ball, except about the head and shoulders, and has a huge mouth, armed with a row of strong, unequal, conical teeth. These reptiles swim or dart along through the water with wonderful celerity, impelled by their long, laterally-compressed, and powerful tails, which serve as very efficient oars. On land their motions are proportionally slow and embarrassed, because of the length and unwieldiness of their bodies, the shortness of their limbs, and the small, false ribs, which reach from joint to joint of their necks, and render lateral motion very difficult. In addition to the usual number of ribs and false ribs, they are furnished with others, for the protection of the belly, which do not rise up to the spine. The lower jaw extends farther back than the skull, so that the neck must be somewhat bent when it is opened; the appearance thus produced has led to the very universal error of believing that the alligator moves its upper jaw, which is incapable of motion, except with the rest of the body. (See plate at article REPTILES.) Under the throat of this animal are two openings or pores, the excretory ducts from glands which pour out a strong, musky fluid, giving the alligator its peculiarly unpleasant smell. In the spring of the year, when the males are under the excitement of the sexual propensity, they frequently utter a loud roar, which, from its harshness and reverberation, resembles distant thunder, especially where numbers are at the same time engaged. At this period frequent and terrible battles take place between the males, which terminate in the discomfiture and retreat of one of the parties. At this season, also, an old champion is seen to dart forth on the surface of the waters, in a straight line, at first as swiftly as lightning, gradually moving more slowly as he reaches the centre of a lake; there he stops, inflates himself by inhaling air and water, which makes a loud rattling in his throat for a moment, until he ejects it with vast force from his mouth and nostrils, making a loud noise, and vibrating his tail vigorously in the air. Sometimes after thus inflating himself, with head and tail raised above the water, he whirls round until the waves are worked to foam, and at length retires, leaving to others an opportunity of repeating similar exploits, which have been compared to an Indian warrior rehearsing his acts of bravery, and exhibiting his strength by gesticulation. The females make their nests in a curious manner, upon the banks of rivers or lagoons, generally in the marshes, along which, at a short distance from the water, the nests are arranged somewhat like an encampment. They are obtuse cones 4 feet high, and about 4 feet in diameter at the base, built of mud and grass. A floor of such mortar is first spread upon the ground, on which a layer of eggs, having hard shells, and larger than those of a common hen, are deposited. Upon these another layer of mortar, 7 or 8 inches in thickness, is spread, and then another bed of eggs; and this is repeated nearly to the top. From 100 to 200 eggs may be found in one nest. It is not ascertained whether each female watches her own nest exclusively, or attends to more than her own brood. It is unquestionable, however, that the females keep near the nests, and take the young under their vigilant care as soon as they are hatched, defending them with great perseverance and courage. The young may be seen following the mother through the water like a brood of chickens following a hen. When basking in the sun on shore, the young are heard whining and yelping about the mother, not unlike young puppies. In situations where alligators are not exposed to much disturbance the sites of the nests appear to be very much frequented, as the grass and reeds are beaten down for several acres around. The young, when first hatched, are very feeble and helpless, and are devoured by birds of prey, soft-shelled turtles, &c., as well as by the male alligators, until they grow old enough to defend themselves. As the eggs are also eagerly sought by vultures and other animals, the race would become speedily extinct, but for the great fecundity of the females. The alligator is generally considered as disposed to retire from man, but this is only to be understood of alligators frequenting rivers or waters where they are frequently disturbed, or have learned to dread the injuries which man inflicts. In situations where they are seldom or never interrupted, they have shown a ferocity and perseverance in atttacking individuals in boats, of the most alarming character; endeavouring to overturn them, or rearing their heads from the water, and snapping their jaws in

a threatening manner. Bartram, who had made many interesting and valuable observations on the alligators, gives numerous instances of their daring and ferocious disposition, and himself very narrowly escaped with his life on several occasions. At present, alligators, though still numerous in Florida and Louisiana, are no longer regarded as very dangerous. Their numbers annually decrease as their haunts are intruded upon by man, and at no distant period they must be nearly, if not quite, exterminated. In the winter the alligators spend a great part of their time in deep holes, which they make in the marshy banks of rivers, &c. They feed upon fishes, reptiles, small quadrupeds (dogs if they can get them), or carrion, and, though very voracious, they are capable of existing a long time without food.

ALLIGATOR-APPLE. See CUSTARD-APPLE.

ALLIGATOR-PEAR (*Persea gratissima*), a fruit-tree of the natural order Lauraceæ, with a fruit resembling a large pear, called the avocado or alligator pear, or subaltern's butter. It contains a fixed oil of a delicate flavour. It is a native of the tropical regions of America and the West Indies.

ALLINGHAM, WILLIAM. See SUPP.

ALLITERATION, the repetition of the same initial letter in several words, or strongly accented syllables, occurring in close succession; as, '*M*any *m*en, *m*any *m*inds', '*W*eave the *w*arp and *w*eave the *w*oof'. Alliteration is frequently used in popular saws and proverbial sayings: as, 'Death defies the doctor', 'Love me little love me long', 'Cool as a cucumber', &c.; and is not seldom employed in poetry with very good effect, as by Coleridge (Ancient Mariner), 'The fair breeze blew, the white foam flew, the furrow followed free'; or Pope, for example, 'Puffs, powders, patches, bibles, billet-doux', and others. In the ancient German and Scandinavian, and in early English poetry, alliteration took the place of terminal rhymes, the alliterative syllables being made to recur with a certain regularity in the same position in successive verses. Alliterative poetry of the stricter form, as we find it in the old High German Hildibrant and Hadubrant, the old Saxon Heliand, in the Anglo-Saxon poetic remains, and especially in old Norse literature, where it received the greatest elaboration and artistic finish, exhibits two short connected verses in which there are regularly three words, or, at any rate, three important syllables, beginning with the same letter, two being in the first verse and one in the second. The couplet of two short verses, it may be remarked, is frequently written in one line with a mark to show the division between the two sections. The early English and the old German poetry are less rigid than the old Norse in their adherence to the rule of having only three alliterative syllables in a couplet. The latter has frequently four, two in the first and two in the second line, or three in the first and one in the second, or only one in each. Vowels are looked upon as having the same sound, and any one of them may alliterate with any other; but exactly the same consonantal sound must be repeated. The following are examples of alliteration in Anglo-Saxon:—

Swíth gesælige; Very happy;
Synna ne cuthon, Sins they knew not.
*H*ám and *h*eáh-setl Home and a high seat
*H*eófena ríces. Of heaven's kingdom.

Alliteration was occasionally used in English poetry in place of rhyme up to and even after 1500, when the English language had essentially assumed its modern form; and long and important poems were written in this measure side by side with those in rhyme. Among the most important of this class of poems subsequent to the Conquest we may mention Layamon's Brut (about 1200), the poem of Piers Plowman (about 1362); Piers the Plowmans Crede (about 1394), Morte Arthure (1440), and Dunbar's The Twa Maryit Women and the Wedo (about 1500), from which we borrow the following lines as an excellent specimen of alliterative poetry:—

"Silver shouris down shook | as the sheen cristal,
And birdis shouted in the shaw | with their shrill notis;
The golden glittering gleam | so gladdened their heartis,
They made a glorious glee | among the green boughis".

In some poems rhyme was superadded to alliteration, and the lines were arranged in regular stanzas, as in the poems of Sir Gawayne and the Grene Knight, Gawayne and Golagros, The Buke of the Howlat, &c. In the hands of some of the poets and prose writers of later times alliteration became a mere conceit, and was employed *usque ad nauseam*. It is employed in Icelandic poetry at the present day as in ancient times, and also in Finnish poetry. So far has alliteration sometimes been carried that long compositions have been written every word of which commenced with the same letter.

ALLIUM, a genius of plants of the natural order Liliaceæ, containing numerous well-known species of pot-herbs. They are mostly perennial, herbaceous plants, but a few are biennial. They are umbelliferous. Among the species are garlic (*A. sativum*), onion (*A. Cepa*), leek (*A. Porrum*), chive (*A. Schœnoprasum*), shallot (*A. Ascalonicum*), and rocambole (*A. Scorodoprasum*). They contain free phosphoric acid and a sulphuretted oil, which is partly dissipated by boiling or roasting.

ALLOA, a river port of Scotland, pleasantly situated on the north side of the Forth, 5 miles from Stirling, and in the county of Clackmannan. It is irregularly built, but contains some good streets and buildings, including the parish church, the county court-house, the town-hall, and the public baths. It carries on several manufactures, chief of which are ale, whisky, woollen yarn, and bottles. There are some large collieries in the neighbourhood. Alloa has an excellent harbour, from which it exports coal, ale, fire-brick, and imports timber, hemp, oak-bark, grain, &c. A new wet dock was opened in 1881. The river is here crossed by a viaduct of the North British Railway. There is an ancient tower in the vicinity, once the residence of the Erskine family. Pop. in 1871, 7511; in 1891, 12,643; in 1901, 14,458.

ALLOBROGES, the name of a people who lived in ancient Gallia Narbonensis, and occupied the country below the Lake of Geneva and the Rhone, now included in Savoy and the French province of Dauphiné. They long struggled for their independence against the Romans, but were finally subjugated by Fabius Maximus.

ALLOCUTION, an address, a term particularly applied to certain addresses made by the pope to the cardinals.

ALLODIUM, land held by a man in his own right, without any feudal obligation. It is opposed to *fee* or *feudum*. In England, according to the theory of the British constitution, all land is held in fee. The word *allodial* is, therefore, never applied to landed property there. Such as is really allodial is said to be held in *fee-simple*. The immense change which took place in France, after its first revolution, by the extinction of all feudal tenures is well known. See FEUDAL SYSTEM and LAND (TENURE OF).

ALLOPATHY, the name applied by homœopathists to systems of medicine other than their own, Hahnemann's principle being that 'like cures like', he called his own system *homœopathy* (Greek, *homoios*, like; *pathos*, disease), and other systems *allopathy* (Greek, *allos*, other, and *pathos*, disease). See HOMŒOPATHY.

ALLOR, one of the Lesser Sunda Islands in Malaysia, between Flores and Timor, belonging to Holland. See OMBAY.

ALLOTROPY (Greek *allos*, another, and *tropos*, habit), a term used in chemistry to express the fact that one and the same substance—elementary or compound—may exist in different forms, so far as physical properties are concerned. Carbon, for example, occurs as the diamond, and as charcoal and plumbago, substances of very different appearance and physical properties, and is therefore regarded as a substance subject to allotropy. Ozone again is an allotropic modification of oxygen, inasmuch as nothing but oxygen can be obtained from ozone, although in many respects these two bodies are very different. Another well-known element illustrating allotropy is phosphorus, which exists both as the ordinary yellow form and as the red or amorphous variety. Allotropy has the same relation to elements as isomerism has to compounds, but the latter term is restricted to organic chemistry. See ISOMERISM.

ALLOWANCES, OFFICERS', in the British army, are special allowances made to officers on account of occasional expenses in addition to their regular pay.

ALLOWAY, an ancient parish in Ayrshire, Scotland, in the district of Kyle, situated on the river Doon, between Maybole and Ayr, now included in the parish of Ayr. Here Robert Burns was born in 1759, and in the 'auld haunted kirk', about a quarter of a mile from his birthplace, he placed the scene of the dance of witches in Tam o' Shanter. Within a short distance are the two bridges over the Doon, the old and the new, and Burns's Monument.

ALLOY, a substance produced by melting together two or more metals. Alloys are sometimes definite chemical compounds of their constituent metals, but more generally they consist merely of mechanical mixtures, or of solutions of one metal in another. Various processes are adopted in the formation of alloys; many are prepared by simply fusing the two metals together in a covered crucible. Most metals mix together in all proportions, as water does with sulphuric acid; but others unite only in definite proportions, and form true chemical compounds. Other metals resist combination, and when fused together tend to gather round separate centres, the alloy thus becoming not a homogeneous mixture, but a conglomerate fused together from masses of distinct metals. The changes produced in their physical properties by the combination of metals are very various, and can be discovered only by actual experiment. Their hardness is in general increased, their malleability and ductility impaired. The colour of an alloy may be scarcely different from that of one of its components, or it may show no traces of either. Its specific gravity is sometimes greater and sometimes less than the mean of that of its component metals; in the alloy of gold with tin it is greater, in the alloy of gold with silver, lead, iron, or copper it is less. Alloys are always more fusible than the metal most difficult to melt that enters into their composition, and generally even more so than the most easily melted one. Newton's fusible metal, for example, composed of three parts of tin, two or five parts of lead, and five or eight parts of bismuth, melts at temperatures varying from 198° to 210° F. (and therefore in boiling water); its components fuse respectively at the temperatures 442°, 600°, and 478° F. Sometimes, on the other hand, each metal retains its own fusing-point, and their union may be dissolved by heating the alloy till the most fusible component is melted. In an alloy of copper and tin the tin may be melted at 442°; the copper requires to be heated to 1996° F.; any temperature between these two points separates the metals. Other metals again, especially if readily fusible, have a tendency when melting to act on any other, however infusible, that may be in contact with them, and to form an alloy with it. Hence a metal of this class that has a strong affinity for two others may be used to unite them. This fact is taken advantage of in the usual process of soldering. With few exceptions metals are not much used in a pure state. The gold and silver of the coinage and of plate goods are alloyed with copper; the pure metals are too soft. British gold coins contain 8⅓ per cent alloy; British silver coins, 7½ per cent. Printers' types are made from an alloy of lead and antimony; brass and a numerous list of other alloys are formed from copper and zinc; bronze from copper and tin. The British bronze coinage consists of copper, 95 parts; tin, 4; zinc, 1 part in every hundred parts.

ALL SAINTS' BAY, or BAHIA DE TODOS OS SANTOS, a bay on the coast of the state of Bahia in Brazil, forming an excellent natural harbour. On its east side stands the port of Bahia. The neighbouring country is well adapted for the cultivation of rice and sugar-cane.

ALL SAINTS' DAY (called in England also *Hallowmas* and *All-Hallows*), a church festival first formally instituted by Gregory IV. in 835, and appointed to be celebrated annually on the 1st of November, in place of the festival of All Martyrs.

ALL SOULS' COLLEGE, Oxford, was founded in 1437 by Henry Chichele, archbishop of Canterbury, for a warden, forty fellows, two chaplains, and clerks. The present arrangement of fellowships was fixed by statutes which came into operation in 1882. The college has the patronage of fourteen livings.

ALL SOULS' DAY, a festival of the Roman Catholic Church, observed on the 2nd of November. It is said to have been instituted by Odilon, abbot of Clugny, in 998. It was observed in Milan until 1582 on the third Sunday in October.

ALLSPICE, or PIMENTA, is the dried berry of a West Indian species of myrtle (*Myrtus Pimenta*), which grows to the height of 20 feet and upwards, and has somewhat oval leaves about 4 inches long, of a deep shining green colour, and numerous branches of white flowers, each with four small petals. This tree is by some botanists referred to the genus *Eugenia* and called *E. pimenta*. Others again constitute a genus *Pimenta*, the present species being *P. officinalis*. In the whole vegetable creation there is scarcely any tree more beautiful or more fragrant than a young pimenta-tree about the month of July. Branched on all sides, richly clad with deep-green leaves, which are relieved by an exuberance of white and richly aromatic flowers, it attracts the notice of all who approach it. About the month of September, and not long after the blossoms have fallen, the berries are in a fit state to be gathered. At this time, though not quite ripe, they are full grown, and about the size of peppercorns. They are gathered by the hand; and one labourer on a tree will strip them off so quickly as to employ three below in picking them up; while an industrious picker will fill a bag of 70 lbs. weight in a day. The berries are then spread on a terrace in the sun to be dried, but this is an operation which requires great care, from the necessity of keeping them entirely free from moisture. By the drying they lose their green colour, and become of a reddish brown; the process is known to be completed by their change of colour, and by the rattling of the seeds within the berries. They are then packed into bags or hogsheads for the market. When the berries are quite ripe they are of a dark purple colour, and filled with a sweet pulp. Pimenta is thought to resemble in flavour a mixture of cinnamon, nutmegs, and cloves, whence it has

obtained the name of *allspice*. It is also called Jamaica pepper. It is much employed in cookery, and is chiefly used in whole grains. It is also employed in medicine as an agreeable aromatic, and forms the basis of a distilled water, a spirit, and an essential oil. The leaves of the pimenta-trees yield in distillation an odoriferous oil, which is not unfrequently used in medical preparations instead of the oil of cloves.

ALLSTON, Washington, an American painter, born in South Carolina in 1779, came to England in 1801, and studied three years in the Royal Academy of London, under the presidency of West. He afterwards resided four years at Rome, and executed a picture of Jacob's Vision, which, by the beauty of its colouring and peculiar effects, produced by a great use of asphaltum after the manner of Rembrandt, attracted considerable notice. In 1811 he revisited England, and gained a prize of 200 guineas from the British Institution for a picture of the Dead Man raised by Elisha's Bones. This picture is now in the possession of the Academy of Arts at Pennsylvania. The most celebrated of his other pictures are Uriel as described by Milton, in the Stafford Gallery; and St. Peter's Deliverance and Jacob's Dream, in the possession of Lord Egremont. In 1814 he published Hints to Young Practitioners on the Study of Landscape-painting. He also published a volume of poetry and a novel called Monaldi. He was elected an associate of the Royal Academy in 1819. He died at Cambridge, Massachusetts, in 1843.

ALLUVIUM (from the Latin *alluvio* or *adluvio*, rising or swelling of a river, flood, deluge) now signifies a gradual increase of land along the sea-shore or the banks of large rivers, or at their mouths. Great alterations in the limits of countries are produced by alluvium—deltas, as at the mouths of the Nile, Ganges, Orinoco, and other rivers, and whole islands being often formed by this cause.

ALMA, a river in the south-west of the Crimea, in the Russian government of Taurida, which flows west and falls into Kalamita Bay, about 20 miles north of Sevastopol. Though insignificant in itself it has acquired celebrity from the battle fought on September 20, 1854, when the Russians, who occupied the lofty heights which line its left bank, with a numerous army and a most formidable artillery, were driven from their position at the point of the bayonet by the British and French.

ALMACK'S, the name formerly given to certain assembly-rooms in King Street, St. James's, London, derived from Almack, a tavern-keeper, by whom they were built, and whose real name is said to have been M'Call, and transformed into Almack by reversing the syllables. They were finally called *Willis's Rooms*. They were first opened about 1770, and became famous for the extreme exclusiveness displayed by the lady patronesses in regard to the admission of applicants for tickets. These fair arbiters composed a board of six, which held its sittings every Monday evening during the London season, and issued those fiats which were supposed to affect so conclusively the claims of the received or rejected applicant, as the case might be, to occupy the upper circles in the fashionable world. To have danced at Almack's became almost proverbial as indicative of exalted social position.

ALMADA, a town of Portugal, in the province of Estremadura, on the left bank of the estuary of the Tagus, opposite Lisbon. It is built upon a height, in a well-cultivated country, and has long been celebrated for its figs. It has a strong castle on a rock, an hospital for British seamen, a Latin school, several depôts for wine, and a mineral spring. Near it is the fort of San Sebastian, which defends the entrance to the Tagus. Pop. (1900), 7913.

ALMADEN, a town of Spain, in the province of Ciudad Real, 55 miles south-west of the town of Ciudad Real, celebrated both in ancient and modern times for its mines of quicksilver, which is found in the form of cinnabar. These mines have been wrought to the depth of 1100 feet without any diminution of the richness of the principal vein. Till the discovery of the California mines (New Almaden) they were the principal source for the supply of mercury in the world. The town is clean and well built. Pop. 7421.

ALMAGEST, a celebrated work composed by Ptolemy, being a collection of the observations and problems of the ancients relating to geometry and astronomy. The original Greek name was Suntaxis Megalē or Megistē, that is, Great or Greatest Compilation. The Arabians, at the time when science flourished among them, translated it about 827, and added their article *al* to the word *megiste;* thus the word *almagest* originated. (See Ptolemy.) In 1230 the Emperor Frederick II. caused this work to be translated from the Arabic into Latin.

ALMAGRO, Diego, one of the companions of Pizarro in the conquest of Peru, was a foundling, and the exact date of his birth is not known. He engaged with Pizarro and Fernando de Lugue in the long and arduous expedition in which they made the discovery of Peru (1524-27), took part in the conquest of the country and the treacherous murder of Atabalipa (1533), and after frequent disputes with Pizarro about their respective shares in their conquests he led an expedition against Chili, of which he was appointed governor. Having failed to conquer his new province he returned to find Cuzco in possession of the Indians, who had expelled Pizarro. He reconquered it and made himself governor, but Pizarro returning a struggle took place between the two parties, in which Almagro was finally overcome, taken prisoner, strangled, and afterwards beheaded in 1538. He was avenged by his son, who raised an insurrection in which Pizarro was assassinated in 1541. The younger Almagro was put to death in 1542 by De Castro, the new viceroy of Peru. Almagro showed himself, like most of the Spaniards engaged in the conquest of the New World, capable of enduring great privations with heroic constancy, and of effecting wonderful achievements by undaunted valour, but cruel, rapacious, and unscrupulous in success.

ALMALEE, a town of Asiatic Turkey, on the river Myra, 25 miles from its mouth, and 50 w.s.w. of Adalia. It is beautifully situated in a kind of natural amphitheatre, inclosed by lofty mountains, and with its numerous gardens, tall poplars, and lofty minarets presents a pleasing and picturesque appearance. Its houses are of unburned brick, roofed with thin deals of cedar, and it has both thriving manufactures and a considerable trade. Pop. 12,000.

ALMA MATER, a term familiarly or gratefully applied by those who have attended a university to the particular university they have attended. The adjective *almus* in Latin means cherishing, fostering, dear.

ALMAMUN. See Caliph.

ALMANAC, a table or calendar, in which are set down the revolutions of the seasons, the rising and setting of the sun, the phases of the moon, the most remarkable conjunctions, positions, and phenomena of the heavenly bodies, for every month and day of the year; also the several fasts and feasts to be observed in the church and state, &c. The history of the almanac, and even the etymology of the word, are involved in considerable obscurity. It is generally

derived from the Arabic article *al*, and the verb *manach*, to count. The modern almanac answers to the *fasti* of the ancient Romans. (See FASTI.) There are several very splendid English almanacs of the fourteenth century existing in MS., particularly in the British Museum. A very curious specimen is in the library of Corpus Christi College, Cambridge. Almanacs became generally used in Europe within a short time after the invention of printing; and they were very early remarkable, as some are now in England, for the mixture of truth and falsehood which they contained. In 1579 their effects in France were found so mischievous, from the pretended prophecies which they published, that an edict was promulgated by Henry III. forbidding any predictions to be inserted in them relating to civil affairs, whether those of the state or of private persons. No such law was ever enacted in England. It is singular that the earliest English almanacs were printed in Holland, on small folio sheets; and these have occasionally been preserved from having been pasted within the covers of old books. In the reign of James I. letters-patent were granted to the two universities and the Stationers' Company for an exclusive right of printing almanacs. These, in 1775, were declared to be illegal. During the civil wars of Charles I., and thence onward, English almanacs were conspicuous for the unblushing boldness of their astrological predictions, and their determined perpetuation of popular errors. The Stationers' Company who had managed, notwithstanding the invalidity of the letters-patent in their favour, to retain a monopoly, were guided merely by commercial principles in supplying the market, and accordingly adapted their almanacs to the taste of the public, who, on one occasion, when the trial was actually made, refused to purchase them without the predictions. Gradually, however, a better taste began to prevail, and in 1828 the Society for the Diffusion of Useful Knowledge had the merit of taking the lead in the production of an unexceptionable almanac in Great Britain. The example thus set has been almost universally adopted. The circulation of almanacs continued to be much cramped by the very heavy duty of one shilling and threepence per copy. In 1834 this duty was abolished. The result is very remarkable. In the Report of the Commissioners of Excise Inquiry on the subject, it is stated that 200 new almanacs were started immediately on the repeal, and that some of these sold upwards of 250,000 copies, although the old ones maintained their ground. Almanacs, from their periodical character, and the frequency with which they are referred to, are now more and more used as vehicles for conveying statistical information. They are adapted to this use in a great variety of ways. Some contain general information for the inhabitants of a particular country or district, others apply themselves specially to the wants of a particular class, and others propagate the statistics or sentiments of a particular party. These special uses are of old standing, and have always given almanacs a special flavour of the times and localities in which they have appeared. Regiomontanus was the first person in Europe who prepared almanacs in their present form, without the predictions, which were in all probability introduced into Europe from the Persians. Once they were almost entirely filled with subjects of a religious character. At another time they overflowed with astrological calculations and predictions. In the time of Napoleon an almanac was published in France, in which, to every day, an achievement of the emperor, or something else relating to him, was added. Almanacs, in the petty principalities of Germany, exhibit the endless genealogical tables of the princes. Some almanacs in modern Greek, printed at Venice, where formerly all books in this language were published, are quite full of astrological superstition and matters relating to the Greek Church. A modern Persian almanac contains a list of fortunate days for certain purposes; as, for example, to buy, to sell, to take medicine, to marry, &c.; and predictions of events, as earthquakes, storms, political affairs, &c. One of the most curious almanacs which we have seen is an Italian one, exhibiting in a striking manner the Italian vivacity. To the 30th of July is added, 'Sudano ancora le ossa!' (Even the bones sweat); to the 11th of August, 'Oh! che noja!' (Oh! how distressing!); to July 12, 'Cascano le braccia' (The arms fall); to January 2, 'Stivali e Ombrello!' (Leggings and umbrellas!) In Germany, *almanach* is the name given to annuals like those which used to appear in England and the United States of America under the names of Souvenir, Forget-me-not, &c. In France a work once appeared annually, entitled Almanach des Gourmands, which was conducted with much spirit, and is in high repute among epicures. Some of the almanacs that are regularly published every year are extremely useful, and are indeed almost indispensable to men engaged in official, mercantile, literary, or professional business. Such in Great Britain are Oliver and Boyd's Edinburgh Almanac, Thom's Official Directory, and the British Almanac, with its Companion. Whitaker's Almanac is also known as a very comprehensive and valuable compendium. The Almanach de Gotha, which has appeared at Gotha since 1764, contains in small bulk a wonderful quantity of information regarding the reigning families and governments, the finances, commerce, population, &c., of the different states throughout the world. It is published both in a French and in a German edition.

ALMANAC, NAUTICAL. An important work of this kind is published in England annually, but two or three years in advance, bearing the name of Nautical Almanac, in which (besides the things most essential for general use that are to be found in other almanacs) are contained many interesting particulars; more especially the distances of the moon from the sun, and from certain fixed stars, for every three hours of apparent time, adapted to the meridian of the royal observatory, Greenwich. By comparing these with the distances carefully observed at sea the mariner may, with comparative ease and certainty, infer his longitude to a degree of accuracy unattainable in any other way, and sufficient for most nautical purposes. This almanac was commenced in 1767 by Dr. Maskelyne, astronomer royal, who, during forty-eight years, devoted the most sedulous attention to it. It was distinguished for accuracy; and though after his death it was not so well conducted, and fell rather into disrepute, it has regained its high character. The French Connaissance des Temps is published with the same views as the English Nautical Almanac, and nearly on the same plan. It commenced in 1679, but was during revolutionary troubles discontinued for a short time. During many years it has been published with great regularity, and in a manner highly creditable to the Bureau des Longitudes. Of a similar nature to the Nautical Almanac and Connaissance des Temps, and not inferior to either of them, is the Astronomisches Jahrbuch published at Berlin. It was conducted for fifty years by Professor Bode with great ability and accuracy. In 1830 Encke became its editor, and enriched it with astronomical papers, which are distinguished for their ability.

ALMANSA, a city of Spain, in the province of Albacete, Murcia, 37 miles east from Albacete. It is a flourishing place, situated on a large and exposed

plain, and is ill built, unpaved, and without any spacious squares—so common all over Spain. It has a parish church and chapel, several schools, a chapter house, an hospital, a capacious prison, and a cemetery outside the town. Manufactures:—Linen, cotton, and hempen fabrics, which are supplied to the neighbouring provinces; brandy, leather, and soap. The plain surrounding the town, irrigated by a reservoir, is of surprising fertility. Here was fought the decisive battle in the war of the Spanish succession in which the French, under the Duke of Berwick, defeated the Anglo-Spanish army under the Earl of Galway. The French were greatly superior to the allies in numbers. Pop. (1897), 10,012.

ALMANZUR, or ALMANSUR. See CALIPH.

ALME, or ALMA, the name given in Egypt to a class of girls whose profession is to sing for the public amusement, being engaged to perform at feasts and other entertainments (including funerals). Many of them are skilful improvisatrici. These singing-girls are not to be confounded with the *ghawazi* or dancing-girls.

ALMEIDA, one of the strongest fortresses in Portugal, is situated in the province of Beira, near the Spanish border, on the Coa. Pop. 2312. In 1762 it was taken by the Spaniards, after great loss, but was restored at the peace. When Ney, 24th July, 1810, attempted to pass over the Coa into Portugal, the British defended the fortress of Almeida against Marshal Masséna till 27th August, when they were obliged to capitulate. Upon Masséna's retreat from Portugal in the spring of 1811, Wellington invested Almeida. Masséna advanced to its relief, and a two-days' battle was fought at Fuentes de Onoro on 4th and 5th May. On the defeat of Masséna the French commander, General Brenier, blew up the fortress on the night of the 11th, and made his way through the midst of the besiegers. The British soon restored the works.

ALMEIDA, FRANCISCO DE, first Portuguese viceroy of India, seventh son of the Conde de Abrantes, was born at Lisbon about the middle of the fifteenth century. His family, one of the noblest in Portugal, had derived its name from the conquest by its founder of the town of Almeida from the Moors. In his youth Francisco served against the same hereditary enemies of his country under Ferdinand, king of Arragon, who retained a vivid recollection of his valour. When Tristan d'Acunha, owing to his blindness, refused the office of governor of the new Portuguese settlements on the African and Indian coasts, Almeida accepted it, and sailed on 25th March, 1505, from Belem, with a fleet of twenty-two vessels and 1500 men, the greatest that had yet been despatched from Portugal. He was accompanied by his son Lorenzo and other eminent men. His orders were to build fortresses at Sofala and Quiloa, and to explore the Red Sea, with a view to the expulsion of the Mohammedans, who then conducted a great part of the trade of the East, and had shown implacable enmity to the Portuguese. He reached Quiloa on 22d July, and took possession of it without resistance. From thence he proceeded to Mombas, which yielded after a severe struggle. After touching at Melinda, of which the king was an ally of Portugal, he reached India in October, 1506. On his arrival at Cochin he despatched a fleet of seven vessels laden with spices to Portugal. This fleet on its voyage home discovered Madagascar. He then sent an expedition against Sofala, which was taken after a determined resistance. He built forts at various points on the coast, and sent his son Lorenzo with a fleet against Calicut. Lorenzo, after having accomplished this mission, took possession of the Maldive Islands and of Ceylon. The Sultan of Egypt, with the aid of the Porte and the Republic of Venice, fitted out a fleet to drive the Portuguese from India. Lorenzo encountered this fleet at Choul or Chowul, south of Bombay, and refusing to flee when he found himself outnumbered perished after a heroic resistance. In the meantime Albuquerque arrived in India with a commission to supersede Almeida, who refused to surrender the government till he had avenged his son and defeated the Mussulmans. In December, 1508, he gained a victory at Dabul over the sultan's fleet, which a few weeks later he annihilated in a great battle at Calicut. Elated by this success, which gave the deathblow to the trade of the Mussulmans in the East, he refused to surrender his power and imprisoned his successor; but on the arrival of Fernando Coutinho from Portugal, he was persuaded to release Albuquerque and return home. He sailed from Cananor in December, 1509. On the voyage home he was killed in a skirmish with the Kaffres, from whom he was carrying off cattle to revictual his fleet, 1st March, 1510.

ALMERIA, a seaport of Spain, capital of the province of Almeria, situated near the mouth of a river in a gulf of the same name, 104 miles east of Malaga. It is inclosed by Moorish bastioned walls, and defended by two forts; consists of a number of narrow, winding, and ill-built streets, with no building of any consequence except a Gothic cathedral. It is the seat of a bishop. Its trade consists of exports of grapes, iron-ore, lead, &c., and imports of coal, woollen, cotton, and silk fabrics, &c. The manufactures are unimportant. The province, which has an area of 3300 square miles, is generally mountainous, and rich in minerals. Pop. of town in 1897, 46,806; of province, 344,681.

ALMOND, the fruit of the almond-tree, the *Amygdalus communis*, a tree which grows usually to the height of 12 or 14 feet. Its pink flowers, composed of five petals, grow in pairs, and appear very early in spring. The leaves are oval, pointed, and delicately serrated at the edges. Its flowers are remarkably beautiful, and form a great ornament of the English shrubberies, particularly as they appear in March and April—a season when few other parts of the vegetable creation have recovered from their wintry state. The common or sweet almond is a soft and pleasantly-flavoured kernel, contained in a nut, which is of flattish shape, and has a tender shell, with numerous small holes on the outside. The genus *Amygdalus* is the type of a sub-order, the Amygdaleæ, which includes the almond, peach, nectarine, &c., and belongs to the natural order Rosaceæ. Though known to the ancients from the most remote period of antiquity, the almond-tree has been cultivated in England only since 1562, and this almost wholly on account of the beautiful appearance of its flowers, since the climate of Great Britain is not sufficiently warm for the fruit to be perfected. The almonds which are consumed in this country and the United States are imported, sometimes in the shell, and often without, from France, Spain, Italy, and the Levant; and they are packed in casks, boxes, or bales. The Jordan almonds, which come from Malaga, are the best sweet almonds brought to Britain. Some preparations of almonds are used in medicine, particularly that called *milk of almonds*, which is formed of pounded almonds, loaf-sugar, and water, well mixed together. Bitter almonds resemble in all respects the sweet almonds, both in the appearance of the kernels themselves and of the trees which produce them, excepting a slight difference in the size of the flowers and fruit. Like the sweet almonds, they yield a large portion of oil. This has no bitterness, but the substance that remains after the pressure is intensely bitter.

If these almonds be eaten freely, they occasion sickness and vomiting, and to many quadrupeds and birds they are a fatal poison. There was formerly a notion, but it is quite erroneous, that the eating of them would prevent the intoxicating effects of wine. They are frequently used instead of apricot kernels in ratafia, and sometimes are employed in making a counterfeit cherry-brandy. The oil and emulsions of bitter almonds are used in medicine, and a powder and paste for washing the hands is made both from them and from sweet almonds. By confectioners they are much used to give flavour to biscuits and other articles. The substance which gives their peculiar flavour to bitter almonds, and to the kernels of peaches, apricots, &c., as also to the leaves of all the species of cherry and peach, is prussic acid, so well known as a powerful medicine and poison. This acid does not exist ready formed in the almond, but when that fruit is subjected to the action of saliva a chemical reaction is set up between two of the constituents of the almond—namely, amygdalin and emulsin—whereby prussic acid is produced. It is the presence of this acid in substances prepared from almonds, &c., which renders a large draught of noyau, or other cordial of a similar kind, so often injurious or even fatal. See PRUSSIC ACID.

ALMONER, in its primitive sense, denoted an officer of any religious establishment, to whom belonged the distribution of alms. By the ancient canons all monasteries were to spend at least a tenth part of their income in alms, and every bishop also was required to keep an almoner. The Grand Almoner (*Grand Aumonier*) of France was the highest ecclesiastical dignitary in that kingdom before the revolution. The Lord Almoner, or Lord High Almoner of England, is an ecclesiastical officer, generally a bishop, who formerly received all deodands and the goods of every *felo de se*, which he had to distribute among the poor. He had also the power of giving the first dish from the king's table to whatever poor person he pleased.

ALMORA, a town and fortress of Hindustan, in the United Provinces, the capital of the district of Kumaon, 170 miles E.N.E. from Delhi, on a hill or ridge 5500 feet above the sea. It consists chiefly of a single street, with a gateway at each end. On the east extremity of the ridge of Almora stands the old Goorkha fort, built of stone, which played an important part in the Goorkha war of 1815, and at the west extremity is the new citadel, named Fort Moira, erected by the British. Almora has been constituted a municipality. There are here an English and an American mission. Pop. (1901), 8596.

ALMQUIST, KARL JONAS LUDWIG, a Swedish writer of remarkable versatility and extraordinary character, was born at Stockholm, 28th November, 1793. After a university training he led a colony to the wilds of Wermland, to live after the manner of the ancient free peasants. Tiring of this life he accepted the rectorship of a school in Stockholm, but in 1840 he quarrelled with the school-board, and was compelled to resign his charge. He next made a journey to France, and on his return became first a contributor to, and afterwards editor of, the periodical Aftonblad. In 1851, being accused of attempting to poison a usurer, he fled to America, where he remained till the end of 1865. During his stay in America he was for a time secretary to Abraham Lincoln. He then returned to Europe, and lived in Bremen under the name of Professor C. Westermann, where he died in November, 1866. His literary activity was extraordinarily great, and his productions display undoubted evidence of genius. He wrote mathematical and arithmetical text-books, historical and geographical hand-books, grammars and lexicons, and numberless treatises on religion, philosophy, and economy, and his novels are the best Swedish works of their kind. His literary works were varied and distinguished by an exuberant fancy. One of them, called Törnrosens Bok (Book of the Wild-rose), is a collection of romantic poems of the most various kinds. Among the most remarkable of his novels are, The Mill of Skällnora, The Chapel, Gabrielle Mimanso, Colombine, &c. Dramas, ballads, and humorous poems are also among his productions.

ALMUG (or ALGUM) TREE, names which occur in 1 Kings x. 11, 12, and 2 Chr. ii. 8 and ix. 10, 11, as the names of trees of which the wood was used for pillars in the temple and the king's house, for harps and psalteries, &c. They are said in one passage to be hewn in Lebanon, in another to be brought from Ophir. They have been identified by critics with the red sandal-wood of India. Some of them may possibly have been transplanted to Lebanon by the Phœnicians. Others regard this tree, and the thyine of Rev. xviii. 12, as the *Thuja articulata*.

ALNWICK, the county town of Northumberland, 34 miles north from Newcastle, built irregularly on the declivities of a hill, near the Alne, which is crossed by a handsome stone bridge. It has several well-formed streets, with a few ancient and many handsome modern houses, a spacious central square, containing on one side a large town-hall with a square tower, and on another an elegant structure, the lower part of which is used for markets and the upper as public rooms; a mechanics' institute, an infirmary, &c. The church is a large Gothic structure, and there are several other places of worship, including one Roman Catholic, which is very handsome. The chief industries are tanning, brewing, and the manufacture of tobacco. The trade in farm produce is considerable. Alnwick Castle, the family mansion of the Percys, which continued to be for many centuries a fortress of great strength, stands on an eminence close to the town, and commands a beautiful view of the country. It is celebrated in border history, and was peculiarly fatal to the kings of Scotland, of whom Malcolm III. and his son Edward fell, and William surnamed the Lion was taken prisoner, before it. Extensive restorations and alterations have recently been made upon it, and additions built. Near the town is the ruined gate-tower of the Premonstratensian Alnwick Abbey, founded in 1147. Pop. in 1891, 6746; in 1901, 6716.

ALOADIN, one of the Old Men of the Mountains, or princes of the Assassins, who flourished in the middle of the thirteenth century. (See ISHMAELITES.) He was the sheik of a Syrian tribe professing the Mohammedan religion, but blindly devoted to the will of their chief, with whose temporal superiority was also mingled a sort of ecclesiastical character. The slightest of his commands is said to have been always executed, though at the expense of certain loss of life to the emissary.

ALOE, the name of a number of plants belonging to the genus *Aloë*, some of which are not more than a few inches, whilst others are 30 feet and upwards in height. The genus *Aloë* constitutes the type of the tribe Aloineæ, and belongs to the natural order Liliaceæ. The aloes have the leaves fleshy, thick, and more or less spinous at the edges or extremity. These plants, which are chiefly inhabitants of hot climates, have flowers with a tubular corolla or perianth, the mouth expanded and divided into six segments, the base nectariferous, and the filaments of the stamens inserted into the receptacle. Some of the larger kinds of aloes are of great importance to the inhabitants of countries in which they grow, the fibrous parts of the leaves being made into cordage, fishing nets and lines, cloth, &c. In the East

Indies the juice of these plants is used as a varnish to preserve wood from the attacks of destructive insects. The inspissated juice of several species of aloes is used in medicine, under the name of *aloes*. The principal drug-producing species are, the Socotrine aloe (*A. Socotrina*), the *Aloë vulgaris* (Barbados), the *A. spicata* (Cape), &c. The first is a native of the island of Socotra and the Cape of Good Hope. It is brought from the latter region to Europe, and also from the West Indies, being carefully cultivated in Jamaica and Barbados. The resinous and gummy juice readily dissolves in proof spirits, and also in hot water, though not so readily. It is one of the best and safest of stimulating purgatives to persons of sedentary habits. A beautiful violet colour is afforded by the leaves of the Socotrine aloe, which does not require a mordant to fix it. The American aloe (see AGAVE) is a different plant altogether; as are also the aloes or lign-aloes of Scripture, which are supposed to be the *Aquilaria Agallochum*, or aloes-wood (which see).

ALOE, AMERICAN. See AGAVE.

ALOES-WOOD, EAGLE-WOOD, or AGILA-WOOD, is the inner portion of the trunk of *Aquilaria ovata* and *A. Agallochum*, forest trees belonging to the natural order Aquilariaceæ, found in tropical Asia. Another tree, the *Aloexylon Agallochum*, which belongs to a different order (Leguminosæ), also produces aloes-wood. These trees contain a fragrant and resinous substance, which appears to be formed by a diseased action in the inner part of the trunk and branches, the rest of the tree being of little value. Its colour is dark, and besides being extensively used as a medicine it is in great request for fumigation, and as incense in the religious ceremonies of the Hindus, Mohammedans, and Roman Catholics. Its fragrance continues unimpaired for years, and it has consequently been employed from a remote period to perfume the chambers of the great and wealthy. It is supposed to be the aloes or lign-aloes of the Bible (Num. xxiv. 6; Prov. vii. 17; Ps. xlv. 8; Cant. iv. 14). The best aloes-wood is obtained in Siam and China; the inferior sort in the Moluccas.

ALOÏNS, crystallizable substances obtained from aloes, having an exceedingly bitter taste.

ALOPECURUS. See FOXTAIL-GRASS.

ALOST, a town of Belgium, in East Flanders, 15 miles W.N.W. of Brussels. It stands on both sides of the Dender, is walled, and contains a large and beautiful, though unfinished, church, by the architect of Amiens Cathedral, adorned with one of Rubens's finest paintings. It has an ancient town-hall, a college, and a hospital; and there are manufactures of lace, cotton goods, hats, leather, &c., and a considerable trade in corn, oil, and hops. It was anciently the capital of imperial Flanders, was taken by Turenne in 1667, and retaken by the allies after Marlborough's great victory of Ramillies in 1706. Pop. (1896), 28,137; (1910), 33,895.

ALP, THE SUABIAN, a regular calcareous mountain range, 70 miles long, and from 9 to 20 broad, in the south of Würtemberg, of which the highest and most barren part is the Rough Alp (*Rauhe Alp*). The highest summits exceed 3000 feet above the sea. It forms the watershed between the Danube and the Neckar. The scenery is varied and picturesque, and there are many remarkable caverns among the hills.

ALPACA. See LLAMA.

ALPES, BASSES-, a frontier department of France, formerly part of Provence, bounded north by the Hautes-Alpes; east by Italy and the Alpes-Maritimes; south by Var and Bouches-du-Rhône; west by Vaucluse and Drôme. In the north and east of the department, on the borders of Italy, Hautes-Alpes, and Alpes-Maritimes, the mountains formed of crystalline and schistose rocks rise to a height of 8000 to 10,000 feet. The other mountains are mostly calcareous, and of more moderate height. There are considerable woods on the flanks of the mountains, but the climate has been much injured by injudicious clearing. In general there is little fertile soil in the department, and though the peasantry are industrious agriculture is backward. A considerable number of sheep and cattle are reared. A little is being done, but slowly, in rewooding. The drainage is carried to the Rhone by the Durance, with the exception of that of a small part which descends to the Var. There is little mining or manufacturing industry. It is the most thinly peopled department in France. The area is 2685 miles. The department contains five arrondissements—Barcelonnette, Castellane, Digne, Forcalquier, and Sisteron. The capital is Digne, situated in the centre of the department. Pop. in 1896, 118,142; in 1901, 115,021.

ALPES, HAUTES-, a department of France, mostly formed out of ancient Dauphiné, bounded north by Savoie; east by Italy; south by Basses-Alpes; west and north-west by Drôme and Isère. The mountains bordering on Italy, Savoie, Isère, and Basses-Alpes rise to heights of from 10,000 to 12,000 feet, and the whole department is traversed by the Cottian and Dauphiné Alps. Some of the smaller valleys, as Vallouise, are richly wooded, and contain fertile plateaux, but in general the department, like that of Basses-Alpes, suffers from deficiency of wood. The climate includes every variety from that of plains which bear the olive to that of the snow-clad mountains. Cattle and sheep are reared in considerable numbers. Agriculture is in a backward state. The drainage of the department falls into the Rhone. There is extremely little mining or manufacturing industry. As late as 1864 there was only one industrial establishment in the department with a steam-engine. This is the lowest department in France in point of absolute population. The area is 2158 miles. The department is divided into three arrondissements—Briançon, Embrun, and Gap. The capital is Gap. Pop. in 1886, 122,924; in 1896, 113,229; in 1901, 109,510.

ALPES-MARITIMES, a department of France, bounded on the north by dep. Basses-Alpes and the Kingdom of Italy; on the east by Italy; on the south by the Mediterranean; on the west by Basses-Alpes and Var. The department is formed of the county of Nice, ceded to France in 1860, and the arrondissement of Grasse, detached from Var. The greater part of the surface is covered by branches of the Maritime Alps. The principal river of the department is the Var. The upper valleys are chiefly pastoral. In the south cereals, vines, olives, oranges, citrons, and other fruits and flowers are grown. The climate, except in the higher elevations, is mild, and the country on the shores of the Mediterranean is a favourite resort for invalids. Mines of copper, manganese, and iron are wrought; and there are numerous manufactories of perfumes, liqueurs, and soap, besides tanneries, paper-mills, potteries, glass-works, &c., and valuable fisheries for tunnies, anchovies, and sardines. Silk-worms and bees are cultivated. Area, 1482 square miles. It is divided into the arrondissements Nice, Grasse, and Puget-Théniers, the capital being Nice. Pop. in 1886, 238,057; in 1896, 265,155; in 1901, 293,213.

ALPHA AND OMEGA, the first and last letters of the Greek alphabet, in the Apocalypse signify the beginning and the end, or the first and the last; that is, before and after all things. These two letters are therefore used as a symbol of the Divine Being. They were also formerly the symbol of Christianity

and engraved accordingly on the tombs of the ancient Christians to distinguish them from those of idolaters.

ALPHABET (from *Alpha* and *Beta*, the two first letters of the Greek alphabet), the ordinary series of the letters or syllables (in syllabic alphabets) of a language. For an account of what is known or conjectured of the origin of alphabetic and other systems of writing, see WRITING. Our alphabet, like most of those of modern Europe, is derived directly from the Latin, but owes its ultimate origin to the Phœnician, which gave birth also to the ancient Greek, the Etruscan, the Gothic, &c. According to tradition the Phœnician Cadmus introduced writing into Greece, the letters first used being the same as the Phœnician, but afterwards undergoing changes both in sound and form. It would appear that the Phœnicians themselves borrowed their alphabet from the hieratic alphabet of Egypt, whence also the Hebrews may have obtained theirs during their long stay in the country, though it is more probable that like others they were content to receive it at second-hand from the Phœnicians. The Hebrew alphabet now employed is not the original one, but has an Aramaic origin, being adopted some time after the captivity. The Hebrew alphabet proper, as we find it on ancient coins, is evidently the same as that of the Phœnician inscriptions. The names of the letters in Phœnician and Hebrew must have been almost the same, for the Greek names, which, with the letters, were borrowed from the former, differ little from the Hebrew. By means of the names we may trace the process by which the Egyptian characters were transformed into letters by the Phœnicians. Some Egyptian character would, by its form, recall the idea of a house, for example, in Phœnician or Hebrew *beth*. This character would subsequently come to be used wherever the articulation *b* occurred, whether in the beginning, middle, or end of a word. Its form might be afterwards simplified, or even completely modified, but the name would still remain, as *beth* still continues the Hebrew name for *b*, and *beta* the Greek. Our letter *m*, which in Hebrew was called *mim*, water, has still a considerable resemblance to the zigzag wavy line which had been chosen to represent water, as in the zodiacal symbol for *Aquarius*. The letter *o*, of which the Hebrew name means eye, was originally intended to represent that organ. From the ancient Greek alphabet are generally derived in a direct line the ordinary Greek alphabet, the Latin, and the Etruscan, though the last may have been directly derived from the Phœnician. The Greek alphabet of later times furnished elements for the Coptic, the Gothic, and the old Slavic alphabets. The Latin characters are now employed by a great many nations, such as the Italian, the French, the Spanish, the Portuguese, the English, the Dutch, the German, the Hungarian, the Polish, &c., each nation having introduced such modifications or additions as are necessary to express the sound of the language peculiar to it. The Greek alphabet originally possessed only sixteen letters, though the Phœnician had twenty-two. These were the five vowels, *α*, *ε*, *ι*, *ο*, *υ*, (*a*, *e*, *i*, *o*, *u*, as in French), and the eleven consonants, *β*, *γ*, *δ*, *κ*, *λ*, *μ*, *ν*, *π*, *ρ*, *σ*, *τ*, (*b*, *g*, *d*, *k*, *l*, *m*, *n*, *p*, *r*, *s*, *t*). According to one tradition, Palamedes, a contemporary of the Trojan war, invented *ξ* (*x*) and the three aspirates *θ*, *φ*, *χ* (*th*, *ph*, *ch* guttural). To Simonides was attributed the invention of the double consonants *ζ* and *ψ* (*ds* or *z*, and *ps*) and the two long vowels *η* and *ω* (*ē* and *ō*), which completed the Greek alphabet of twenty-four letters as still used. Besides these, there was anciently the *digamma*, a character corresponding pretty nearly to *v*, which afterwards slipped out of the Greek alphabet; and the character ' representing an aspirate at the beginning of words.

The original Latin alphabet, as it is found in the oldest inscriptions, consisted of twenty-one letters; namely, the vowels *a*, *e*, *i*, *o*, and *u* (*v*), and the consonants *b*, *c*, *d*, *f*, *z*, *h*, *k*, *l*, *m*, *n*, *p*, *q*, *r*, *s*, *t*, *x*. *z* slipped out at an early period, and *g* took its place. To these we might also add the characters *æ* and *œ*, representing the Greek diphthongs *αι* and *αι*. The letters *i* and *u*, it must be remarked, had a double force, that of a vowel, and that of a consonant. In the latter case they were, after the introduction of printing, changed frequently into *j* and *v*. The *i* consonant, as in *iuventus* (youth), had a sound resembling that of *y* in English, or *j* in German; *u*, consonant, as in *uespa* (*vespa*), a wasp, had a sound much like the English *w*—*wespa*. (At least this opinion appears best supported by the evidence.) No genuine Latin word contains either *y* or *z*, these being used in foreign (chiefly Greek) words adopted into the language; and *k* is found in classical Latin only in *Kalendæ*. While the alphabets of the west of Europe are derived from the Latin, the Russian and other Slavonic alphabets of the East come from the Greek. The modern Russian, which consists of thirty-five letters, is a modification and simplification of the ancient Cyrillic alphabet, which was invented by Cyril in the ninth century in order to translate the Gospels into the language of the Slaves of Bulgaria and Moravia. It was formed of Greek letters, together with some borrowed from the Armenian and Coptic alphabets, which themselves were descended from the Greek. The Anglo-Saxon alphabet (see ANGLO-SAXONS) had two letters for the two sounds of *th*, which appear to have come from the Greek through the Mœso-Gothic, and which were unfortunately not retained in later English. It wanted the letters *j*, *k*, *q*, *v*, *z*, but it had the sound *æ*. The German alphabet consists of the same letters as our own, the common German characters being mere modifications of the Roman, but the sounds of some of them are different. Anciently certain characters called *Runic* (see that word) were made use of in Germany and Scandinavia, to which some would attribute an origin independent of the Greek and Latin alphabets. Among Asiatic alphabets, the Arabian has played a part exactly analogous to that of the Latin in Europe, the conquests of Mohammedanism having imposed it on the Persian, an Aryan language; the Turkish, a Tatar language; the Hindustani, also an Aryan language; and even the Malay. It consists of twenty-eight letters, and appears to derive its origin from the Sinaitic alphabet, which was employed during the first centuries of the Christian era, and is found in inscriptions in the Sinaitic peninsula, at Petra, in the Hauran, &c. The Sanskrit or Devanagari alphabet is one of the most remarkable alphabets of the world. As now used it has fourteen characters for the vowels and diphthongs, and thirty-three for the consonants, besides two other symbols. The vowel *a* short is to be understood after every consonant, unless excluded by another vowel immediately attached to the consonant. (See SANSKRIT LANGUAGE and LITERATURE, also the articles on the different languages and letters.) We may here remark that our alphabet is by no means a perfect instrument for what it has to perform, but is both defective and redundant. It is estimated that there are forty-two sounds in the language, and only twenty-six letters to represent them. *A*, to begin with, has to do duty for at least four different sounds, as in *far*, *fat*, *fall*, and *fame; o* has three sounds, as *not*, *note*, and *move; e* has a long sound and a short, as in *mete* and *met*. *C* is a useless letter altogether, since it has always either the sound of *s* or of *k*. Others of the consonants encroach upon each other's provinces; *g*, for example, sounds sometimes like *j*, as in *digest; f* sounds *v* in

af; *s* sometimes usurps the sound of *z*, as in *raisin*, sometimes that of *zh* or *sh*, as in *pleasure*. The soft *th* again has nothing to do with *t*, but is allied to *d*, and was represented in Anglo-Saxon by a letter resembling *d*, which it is a pity we do not still retain. *Sh* and *ch* (as in *church*) are both simple sounds, and would be represented by single letters in a scientifically constructed alphabet.

ALPHEUS, the largest river of Peloponnesus, now called the Rufia, rises in Arcadia, and flows northwest through Arcadia and Elis, receiving many affluents, and falls into the Ionian Sea shortly after passing the celebrated Olympia. At one or two points it flows for some distance underground, and it was a popular belief among the Greeks that it flowed under the sea and appeared again close beside the fountain of Arethusa at Syracuse.

ALPHONSO III., King of Leon and Asturias, called the *Great*, succeeded his father Ordoño, in 866, at the age of eighteen years; according to some, in 862, when fourteen years old. After having subdued by force the powerful nobles of his kingdom, who saw with jealousy the royal dignity remain hereditary in a family, he turned his arms against his foreign enemies, and distinguished his reign by more than thirty campaigns, and numerous victories obtained over the Moors. He crossed the Douro, overthrew the walls of Coimbra, passed the Tagus into Estremadura, added to his dominions a part of Portugal and Old Castile, and peopled Burgos anew. But all these successes did not conciliate his subjects, and he had the grief of seeing his own son, Don Garcia, at the head of the malcontents, endeavouring to tear the crown from his head. Alphonso defeated the rebels, took his son prisoner, and kept him in close confinement at the castle of Gauson (907). The queen, Donna Ximena, then formed a dangerous conspiracy in Garcia's favour, and armed both her other sons against the king. A bloody war desolated the kingdom until Alphonso, defeated by his own son, abdicated the crown, and placed it on Don Garcia's head (910). He afterwards commanded an army, as the general of his son, against the Moors (912), conquered them repeatedly, and returned each time enriched with booty. He died at Zamora, 912. According to other accounts the last events occurred in 910, in which year Alphonso is said to have died.

ALPHONSO VI. OF LEON, AND I. OF CASTILE, surnamed the *Valiant*, was the second son of Fernando I., king of Castile, who also inherited Leon. Fernando, dying in 1065, divided his dominions among his three sons, and Alphonso obtained the Kingdom of Leon, his brother Sancho that of Castile, and Garcia Galicia. Sancho, the eldest, dissatisfied with this division, invaded the Kingdom of Leon, and after much fighting with varied success, surprised Alphonso in his camp, compelled him to abdicate, and consigned him to the monastery of Sahagun. He succeeded in making his escape, and fled to the court of Almamun, the Moorish king of Toledo. When Sancho was assassinated before the walls of Zamora in 1072, Alphonso was acknowledged king of Leon and Castile. He also seized Galicia from his brother Garcia. He then quarrelled with Almamun, and after besieging Toledo for five years captured it from the Mussulmans. He reduced also Coria, Madrid, Guadalajara, and other places of importance, and rendered the kings of Saragossa and Badajoz tributary. He was besieging Saragossa when the Moors called in to their aid the celebrated Yussef Ben Tashfyn, and at a great battle which was fought on the plains of Zalaca, Alphonso was wounded and compelled to retreat, but the Moors were too much weakened then to follow up their success. He died in 1109, and having no male issue, left to his eldest daughter Urraca the united crowns of Leon and Castile.

ALPHONSO IX. (called also III. or VIII.), King of Castile (not of Leon), surnamed the *Noble* or the *Good*, succeeded his father Sancho III. in 1158. After a turbulent minority he obtained the command of the kingdom, and married Eleanor, daughter of Henry II. of England, in 1170. In 1195 he sustained a disastrous defeat from the Moors at Alarcos, and was subsequently nearly ruined by the combination against him of the kings of Leon and Navarre, from whom he had rescued territories taken during his minority. Peace was at length effected in consequence of the formidable preparations of the Moors, a crusade was preached, and Alphonso led against them the united armies of Arragon, Navarre, and Castile, with the volunteers of other parts of Europe, and gained a decisive victory near Tolosa on 17th July, 1212. He died 6th October, 1214, and was succeeded by his infant son, Enrique I.

ALPHONSO X., King of Leon and Castile, surnamed the *Astronomer* or the *Philosopher*, born in 1221 or 1226, succeeded his father, Ferdinand the Holy, in 1252. His love of the sciences and of law, and his surname of *Sabio* (the wise), gave his subjects hopes of a happy reign; but the event did not answer their expectations. Alphonso was neither loved by his family, his subjects, nor his neighbours; but his learning and eloquence had given him such a reputation in Europe, that many German princes favoured his claim to the imperial throne. Instead of employing himself in expelling the Moors and humbling his own nobility, he exhausted the strength of his kingdom by endeavouring to secure his election to the imperial throne. He secured a part of the electors in 1257, but Richard, earl of Cornwall, was chosen. On his death in 1272 he again contested the imperial crown against Rudolf of Hapsburg, and attempted to upset his election; but Pope Gregory X. not only refused to acknowledge him as emperor, but even to allow his right to Suabia, which he claimed through his mother, Beatrice, daughter of Philip I., archduke of Suabia. In the meantime his throne was endangered at home by the conspiracies of the nobles and the attacks of the Moors. He finally conquered them in a bloody battle in 1263, took from them Xeres, Medina-Sidonia, San-Lucar, and a part of Algarve, and united Murcia with Castile. But these victories were interrupted by new troubles, excited by his son, the infante Philip, which he succeeded in quieting only after three years' war. But the mildness with which he treated the rebels was considered only a proof of weakness, and when he at last determined to act with rigour against his own family, his son Sancho again rebelled and in 1282 deprived him of his crown. Alphonso sought support in an alliance with the Moors, and died in 1284, soon after he had received the submission of Sancho. Alphonso was the most learned prince of his age, and has gained a lasting fame by his collection of laws, called Las Siete Partidas. Europe is indebted to Alphonso for the astronomical tables which go under his name. Under his patronage the first general history of Spain was composed, in the Castilian tongue, and the Bible translated. He contributed much to the revival of science, and with this view strove to increase the privileges and the professorships of the University of Salamanca.

ALPHONSO XI. OF CASTILE, surnamed the *Avenger*, son of Ferdinand IV., succeeded his father in 1312, when only an infant. After a minority disturbed by intestine feuds, and during which his uncle and grand-uncle, joint-regents of the kingdom, fell in one battle (1319) against the Moors, he assumed the government with consent of the Cortes

in 1324. He acquired the title of Avenger by the severity with which he repressed the turbulence of the nobility. He lost Gibraltar to the Moors in 1333. In 1340, at the head of the allied armies of Spain and Portugal, he defeated the armies of the Emperor of Marocco and the King of Granada at Rio Salado, with a slaughter of which the most exaggerated accounts are given by Spanish chroniclers. This battle gave the death-blow to the Mohammedan power in Spain. In 1344 he captured Algeciras after a siege of two years, notwithstanding that the Moors employed cannon in defence of the walls, said to have been the first occasion of their being employed in Europe (but see CANNON). In violation of the treaty made at this time Alphonso besieged Gibraltar in 1349. After prosecuting this siege for six months without success, he died of the plague before the place 26th March, 1350.

ALPHONSO V. OF ARRAGON, known also as Alphonso I. of Naples, born in 1385, was the son of Ferdinand I. of Arragon, the throne of which he ascended in 1416. He inherited also the Kingdom of Sicily and the island of Sardinia. In 1421 he went to Naples, Queen Joanna having promised to make him her heir on condition of his assisting her against Louis of Anjou. He had sent his fleet here the previous year and forced Louis to retire from Naples; but Louis was afterwards taken into favour by Joanna, and Alphonso returned to Spain, where affairs demanded his presence. After a stay of eight years in Spain he returned in 1432 to Naples, where, during his absence, a protracted war between the partisans of the Angevin and Arragonese factions had terminated in the submission of the entire country to Queen Joanna. He endeavoured unsuccessfully to reconcile himself with the queen, who died in February, 1435, bequeathing her dominions to René of Anjou, brother of Louis, the latter having died a short time previously. The war was thereupon resumed between the two hostile factions, and Gaeta was blockaded with a fleet by Alphonso. Here he was defeated and taken prisoner by Filippo Maria Visconti, duke of Milan, who, however, from admiration of his character, set him at liberty and became his ally. Two unsuccessful sieges of Naples were conducted by Alphonso in 1436 and 1438, a third was commenced in 1441, and in June, 1442, Alphonso carried the city by stratagem. The Duke of Anjou, now conceiving his cause to be desperate, took his departure, and Alphonso, after subduing the Abruzzi, Apulia, and Calabria, remained undisputed sovereign of the kingdom. He also succeeded subsequently in procuring an investiture of the sovereignty from the holy see. The remainder of his life was comparatively tranquil. He died in 1458, from having overexhausted himself in hunting. As a monarch Alphonso seems to have possessed many noble and generous qualities, and numerous anecdotes are related in testimony of these. He was also an enlightened patron of literary men, by whom, in the latter part of his reign, his court was thronged from all quarters. In the embellishment and improvement of the city of Naples he likewise effected many important results.

ALPINE PLANTS, the name given to those plants whose habitat is in the neighbourhood of the snow, on mountains partly covered with it all the year round. As the height of the snow-line varies according to the latitude and local conditions, so also does the height at which these plants grow. The mean height for the alpine plants of Central Europe is about 6000 feet; but it rises in parts of the Alps and in the Pyrenees to 9000, or even more. The high grounds clear of snow among these mountains present a very well marked flora, the general characters of the plants being a low dwarfish habit, a tendency to form thick turfs, stems partly or wholly woody, and large brilliantly-coloured, and often very sweet-smelling flowers. They are also often closely covered with woolly hairs. In the Alps of Middle Europe the eye is at once attracted by gentians, saxifrages, rhododendrons, primroses of different kinds, &c. Ferns and mosses of many kinds also characterize these regions. Some alpine plants are found only in one locality. Little success has attended the attempt to grow alpine plants in gardens.

ALPINI, PROSPERO, an eminent physician and naturalist, was a native of the Venetian Republic, and born in 1553. He studied medicine at the University of Padua, and afterwards accompanied the Venetian consul to Egypt, where a residence of three years enabled him to extend his knowledge of plants and of vegetable economy. From observations he made on the management of date-palm trees in that country it appears that he deduced the doctrine of the sexual difference of plants, which was assumed by Linnæus as the foundation of his system. He returned to Venice in 1586, practised at Genoa, and eventually filled the botanical chair in Padua, where he died in 1617, leaving various works on medicine in general, on the practice of medicine among the Egyptians, on the Plants of Egypt, on Exotic Plants, &c.

ALPS, the highest and most extensive system of mountains in Europe. It covers a great part of Northern Italy, several departments of France, nearly the whole of Switzerland, and a large part of Austria, while its extensive ramifications in Italy, Germany, the Balkan countries, Turkey, and Greece, connect it with several other mountain systems of Europe. The name is derived from the Celtic *alb*, which by some is made to signify white, by others, height. In the immediate neighbourhood of the mountains *alp* has a peculiar meaning, and signifies one of the high pastures for which the Alps are distinguished. This great congeries of mountains may be said to be included between lat. 44° and 48° N.; and lon. 5° and 18° E. The culminating peak of the whole system is Mont Blanc, 15,781 feet high, though the true centre is St. Gothard, or rather the mountains between the sources of the Rhone and the Inn, and the Swiss cantons Valais, Bern, Uri, and Grisons on the north; and canton Tessin, and Lombardy and Sardinia on the south. It is a curious fact, that its great central mass is nearly equidistant from the pole and from the equator. From its slopes flow, either directly or by affluents, the great rivers of Central Europe, the Danube, Rhine, Rhone, and Po. Round the northern frontier of Italy the Alps form a remarkable barrier, shutting it off at all points from the mainland of Europe, so that, except in the valley of the Adige, where a remarkable break occurs in the chain, or at the opposite extremity at Nice, it can only be approached from France, Germany, or Switzerland, through high and difficult passes. Accordingly nearly all the great passes of the Alps are connected with roads from the northern countries into Italy.

As usual with mountain systems of great altitude, the highest peaks of the Alps are reached by a gradual ascent through a succession of outer ranges and elevated intermediate valleys. The total width of the system is therefore always great, and can hardly anywhere be measured with precision, opinion varying as to the points at which the outer limits should be fixed. Towards the east, however, the system, while it diminishes in height, becomes more widely extended, some of the transverse valleys extending to 150 miles, while that of the Drave reaches 200. From Bellinzona in the canton of Tessin, to Altorf in that of Uri, the distance is 50 miles. The outer range is called by the Italians *Pre-alpi*,

by the Germans *Voralpen*. The main chain of the Alps, which commonly determines the water-shed of the countries through which it passes, contains some of the highest peaks; but at several points there are extensive ramifications of the system proceeding at various angles from the main chain, and more or less connected with it, and which sometimes exceed in mass and altitude the corresponding parts of the principal chain. Such are the Alps of Dauphiné and Savoy, and the Bernese Alps. The principal valleys of the Alps run mostly in a direction nearly parallel with the principal ranges, and therefore east and west. The transverse valleys are commonly shorter. In the section called the Lepontine Alps, however, long ranges run north and south, forming valleys transverse to the dividing line of the waters, and terminating in the great Italian lakes. The slopes toward the south are more precipitous than towards the north, and as most of the collateral ranges lie to the north of the main chain the great valleys are mostly to be found in the intervals between them. The transverse valleys of the Alps frequently lead up through a narrow gorge to a depression in the main ridge between two adjacent peaks. These are the passes or *cols*, which are found by tracing a stream which descends from the mountains up to its source. The col is usually found to receive the drainage of the neighbouring peaks, and when it is of sufficient extent a small lake is generally formed, from which a stream flows down on each side. When the one stream has been traced up to its source the passage across the mountains is completed by following the course of the other. The principal passes, now well known, are more than fifty in number; but there are many others more difficult and dangerous which have never had more than a local reputation.

The common divisions of the Alps have been taken from the Romans, whose acquaintance with the Alps as the northern boundary of Italy was considerable, yet their classification, being formed mostly for practical purposes, was far from complete. Several modern divisions have been added. The Romans were acquainted with many of the best passes, to which from their altitude they gave the name of *Mons*. Before noticing these divisions, a glance may be taken at the general direction of the main chain. The most convenient starting-point is on the Mediterranean coast, near Nice. Eastward the chain proceeds along the coast till it forms a junction with the Apennines, which may be considered as one extremity of the system. In the opposite direction it proceeds north-west, and afterwards north on the boundaries of France and Italy to Mont Blanc; it then turns north-east and runs generally in this direction to the Gross Glockner, in Central Tyrol, between the Drave and the Salza, where it divides into two branches, the more northerly of which proceeds north-east towards Vienna. The southern chain subdivides again, one branch running in a southerly direction, connects itself with the mountains of Dalmatia, and by a south-easterly continuation with the Balkan and the mountains of Greece; the middle branch proceeds towards the Drave and Danube. With these continuations, which lose themselves insensibly in other ranges, the Alps may be considered to terminate.

The Maritime Alps.—The first great division of the Alps extends from their junction with the Apennines to Monte Viso, a distance of about 100 miles. This mountain is the most prominent object from the basin of the Po, wherever the Alps are visible. The division of the Alps from the Apennines has been variously fixed at Col di Tende and Col d'Altare, near Savona. The northern limit of the Maritime Alps is to the south of Monte Viso. The culminating-points are the Aiguille de Chambeyron, 11,155 feet, and the Grand Rioburent, 11,142 feet. The principal pass is the Col di Tende (6158 feet), which was made practicable for carriages by Napoleon. It leads from Nice to Turin. The road is dreary, but commands a view of the Alps from Col d'Iséran to Monte Viso. There are carriage roads over the Col di San Bernardo and Col di Nava. Numerous tributaries of the Po and the Durance with the Var and other lesser rivers rise in the Maritime Alps.

The Cottian Alps—anciently named after a chief of the district, and extending from Monte Viso to Mount Cenis—consist of numerous mountain masses irregularly grouped, the main line running north-east, and the principal ramifications to the west of it. The length is about 60 miles. Modern geographers have distinguished a separate group, divided from the main chain by the valley of the Durance, which are called the Dauphiné Alps. These contain lottier peaks than the main chain. Principal peaks of the Cottian Alps, Monte Viso, 12,605 feet; Chardonnet, 12,373; Ciamarella, 12,081; of the Dauphinese Alps: Pic des Écrins, 13,462; La Meije, 13,081; Pelvoux, 12,973. There is a carriage road by Mont Genèvre (6102 feet) between the valleys of the Durance and the Dora Riparia, and by the Col de Sestrières (6335 feet) from Cesanne to Pignerolo. The road by the former, Cesanne to Briançon, was constructed by order of Napoleon. The difficult pass of Col de la Roue, Bardonnèche to Modane, is that supposed to have been traversed by Cæsar in order to attack the Helvetians. The Durance and the Dora Riparia rise in the Cottian Alps.

Graian Alps, from Mount Cenis to Mont Blanc (50 miles long). This group has extensive ramifications in Savoie and Piedmont. The principal peaks are, in the main chain, Aiguille de la Sassière, 12,326 feet; in the Piedmontese group, Grand Paradis, 13,300; in the Savoie Group, Grande Casse, 12,780. Mount Cenis (6765 feet), the most frequented of all the Alpine passes, was crossed by Pepin to attack the Lombards. A carriage road over it was constructed by Napoleon in 1803–10, leading from the valley of the Arc to Turin, and uniting with the road from Mount Genèvre at Susa. A railway now passes through the mountain by a tunnel nearly 8 miles long. (See CENIS.) The pass of Little St. Bernard (7192 feet) passes between the valleys of the Isère and Aosta. It was made practicable for cars by Augustus, but is now only practicable for mules. It appears to have been the road taken by Hannibal. The Col de Bonhomme (8195 feet) communicates with the Col de la Seigne (8327 feet) in the Pennine Alps. They lead by a mule path from Contamines to Courmayeur. The Stura, and Orca, and the Arc and Isère, rise in the Graian Alps.

The *Pennine Alps* (Celtic, *pen* or *ben*, a hill) is the loftiest range of the whole system, having Mont Blanc at one extremity, and Monte Rosa at the other (60 miles). Here also begin the most extensive ramifications of the system, some of the collateral ranges rivalling or exceeding in mass and altitude the main chain. The Alps of Haute Savoie form a north-western continuation of this range. The northern boundary of the Pennine Alps is the Valais, or upper valley of the Rhone. On the opposite side of this valley, and nearly parallel with the main chain, runs the great range of the Bernese Alps. Here the grandest panoramas of Alpine scenery are exhibited. The great peaks of the two vast ranges are only about 20 miles apart, and between them run transverse ranges presenting innumerable secondary heights. From the Matterhorn (Mount Cervin), between Mont Combin and Monte Rosa, a

series of great heights, including the Weisshorn and the Gabelhorn, run to the north. The main range contains Mont Blanc, Monte Rosa, and Mount Cervin, three of the highest peaks in Europe. On the west the Bernese Alps are connected with the Jura range. The principal heights of the Pennine Alps are Mont Blanc, 15,781 feet; Monte Rosa, 15,217; Mischabelhörner (Dom), 14,935; Lyskamm, 14,889; Weisshorn, 14,804; Matterhorn, 14,780. In the Bernese Alps are, the Finsteraarhorn, 14,026; Aletschhorn, 13,803; Jungfrau, 13,671. There are bridle passes, the Col de la Seigne, already mentioned, and the Col de Ferret (8320 feet), on each side of Mont Blanc. The pass of Great St. Bernard is celebrated for its hospice. (See BERNARD, GREAT ST.) It was crossed by Napoleon in 1800, but it is not practicable for carriages. There are several passes, as the Col du Cervin, the Schwarzthor, and the Col du Lys, from 10,000 to 14,000 feet in height. The most easterly pass is the Simplon, 6595 feet, from Brieg to Domo D'Ossola. It has a carriage road made by Napoleon. This is about 36 miles long and 25 feet wide throughout, and is carried over steep precipices and through six galleries hewn in the rock. The Grande Galerie is 683 feet long. A double railway tunnel, the longest in the world (12½ miles), has been driven through the Simplon. Numerous tributaries of the Rhone rise in the valley between the mountains, and on the Italian side the Dora Baltea, Sesia, and other rivers.

The Lepontine Alps form the continuation of the main chain on the south side of the great valley or depression stretching from Martigny in the Valais to Coire in the Grisons, the western portion of which forms the basin of the Rhone, the eastern that of the Vorderrhein. From this chain branch the northern and eastern extensions of the Swiss Alps beyond the Bernese range, the eastern boundary of which is fixed at the defile of the Devil's Bridge, near Andermatt, crossed by the Reuss. The Lepontine range extends to the Splügen Pass. The line of watershed is generally parallel to the valley of the Vorderrhein; but here, as already noticed, some of the principal ranges run transverse to it, terminating in the great valleys in which lie the lakes Maggiore, Como, &c., fed by numerous tributaries from this and the following division of the Alps. This division forms the great water-parting of the whole system. Within a radius of a few miles from the St. Gothard Pass rise the Rhone, the Aar, the Reuss, the Vorderrhein, the Ticino, the Toccia, and the Maggia. The principal pass is the St. Gothard (6936 feet), over which passes a carriage road from Bellinzona to Altorf. Through this mountain mass a railway tunnel more than 9 miles long was opened in 1882. The Gries Pass (8050 feet) conducts from Obergestelen to Formazza. The Bernardin Pass (6769 feet), constructed by the Swiss government, leads from Coire to Bellinzona. The road from Coire to the Splügen is the same as leads to the Splügen Pass (6945 feet), through which it proceeds to Lake Como. This route commands the finest views of Swiss scenery in the Grisons. Previous to the construction of the present road by the Austrian government in 1823 it was difficult and dangerous. Marshal MacDonald, who crossed it in 1800, lost a large number of men by avalanches at a gorge in the passage of the Cardinello, which the new road avoids. The carriage road over the Furka Pass from Obergestelen to Andermatt, completed in 1867, affords a fine view of the Schreckhorn and Finsteraarhorn. The peaks here are of less elevation. The highest, Monte Leone, is 11,696 feet; the Piz Valrhein is 11,148 feet, and several are above 10,000. Of the northern ranges Tödi is 11,887; Bifertenstock, 11,237; Scheerhorn, 11,132, and there are many above 10,000.

The Rhætian Alps extend from the Splügen to Dreiherrnspitz, on the borders of Salzburg and Tyrol. The Engadine, or valley of the Inn, divides them into two portions. The chain is also broken by the valley of the Adige. To the south, separated by the valley of the Adda, are the Lombard Alps, while the more northerly continuations embrace the Tyrolese and Bavarian Alps. In the main range are the Piz Bernina, 13,294 feet; Piz Roseg, 12,936; Ortelerspitze, 12,814; in the Lombard Alps, Monte Adamello, 11,832; Presanella, 11,688; and Care Alto, 11,352. The other ranges are inferior in height. Good roads now become more numerous. The Malloya Pass (5942 feet) leads from Chiavenna, by the valley of the Inn, to Innsbruck, and communicates with the road over the Julier Pass (7503 feet) to Coire. The Pass of Glurns (4400 feet), from the valley of the Inn to the Adige, is the lowest pass over the main chain. It joins the road to Milan by the Valtelline, the highest part of which is 9174 feet. This is a carriage road constructed by the Austrian government for communication with their Lombard dominions. The Brenner Pass (4588 feet) leads from Verona to Innsbruck. The Brenner is crossed by a railway. The northern ranges are intersected by the Septima, Julier, Albula, and other passes. The Adda, Oglio, Adige, Hinterrhein, Inn, and other rivers, rise in this part of the chain.

Noric Alps.—The main chain of the Alps here divides into different sections, as already mentioned. The northern part of the chain extending to Vienna was anciently called the Noric Alps, while the southern continuations were known as the Carnian and Julian Alps, the names Venetian, Dalmatian, and Pannonic Alps being also in use. The culminating peak of the northern range is the Gross Glockner, 12,405 feet. Farther east the heights are of much less elevation. In Carinthia and Styria two parallel branches called the Styrian Alps inclose the upper valley of the Mur. In this group is the Hafnereck, 10,044 feet. In South Tyrol and Venetia several peaks rise above 10,000 feet. The Carnic Alps run from the frontiers of Tyrol and Venetia to the frontier of Carinthia. They are separated from the northern range by the Gailthal. The height of the south-eastern continuations of the Alps rapidly diminishes, and they lose themselves in ranges having nothing in common with the great mountain masses which distinguish the centre of the system. Mount Terglou, near the north-western extremity of the Julian Alps, has a height of 9371 feet. The name Dinaric Alps is given to a continuation from Mount Klek, through Croatia, and along the borders of Dalmatia and Herzegovina.

There are various points of vantage from which extensive views of Alpine scenery can be obtained. The highest attainable by railway (electric) is the Jungfrau (13,671 feet). The Rigi can also be ascended by railway, and there are hotels at the top, 5905 feet above sea level, and 4468 above the Lake of Lucerne. A favourite view from hence is to watch the sun rise over the Bernese Alps. The Faulhorn (8799 feet), south-east of Lake Brienz, commands a near view of the same range. The Becca di Nona (8415 feet), south of Aosta, gives, according to some authorities, the finest panoramic view to be obtained from any summit of the Alps. From the Gorner Grat (to which there is now a railway from Zermatt), and various points in the valley of Chamonix, particularly the Montanvert, which is visited to see the Mer de Glace, views of various interest are obtained. The most accessible Alpine glaciers are those of Aletsch, Chamonix, and Zermatt.

Climate.—In the lower valleys the mean temperature ranges from 50° to 60°. Half-way up the Alps it averages about 32°—a height which, in the snowy

regions, where snow always lies, the average does not attain. But even here, the solar radiation produced by the rocks and snow is often so great as to raise the barometer to 120° and even higher. The exhilarating and invigorating nature of the climate in the upper regions of the Alps during summer has been acknowledged by all who have perambulated these romantic scenes. The freshness of the breeze, as it comes from the snowy peaks, tempered by the rays of a southern sun, enable the traveller, without weariness, to perform distances on foot that at home he would have shrunk from attempting. Notwithstanding, however, the invigorating nature of the climate, the inhabitants of the higher valleys are often afflicted with goitre and cretinism.

Botany and Zoology.—In respect to vegetation the Alps have been divided into six zones. The limits of these depend not on absolute height, but on height modified by exposure and local circumstances. The lowest is the olive zone. This tree flourishes better on sheltered slopes of the mountains than on the plains of Northern Italy. The vine, which bears a greater winter cold, distinguishes the second zone. On slopes exposed to the sun it flourishes to a considerable height. The third is the mountainous zone or region. Cereals and deciduous trees form the distinguishing features of its vegetation. The mean temperature about equals that of Great Britain, but the extremes are greater. The fourth region is the sub-Alpine or coniferous. Here are vast forests of pines of various species, which have in many places been inconsiderately cut down, the result being that the valleys have been deprived of shelter and denuded of soil. Most of the Alpine villages are in the two last regions. On the northern slopes pines grow to 6000, and on the southern slopes to 7000 feet above the level of the sea. This is also the region of the lower or permanent pastures where the flocks are fed in winter. The fifth is the pasture region, the term *alp* being used in the local sense of high pasture grounds. It extends from the uppermost limit of trees to the region of perpetual snow. The landscape is adorned with numerous shrubs, rhododendrons, junipers, bilberries, and dwarf willows being among the distinctive forms of vegetation. The sixth is the region of perpetual snow. The line of snow appears from a distance to be continuous at a limit which varies, according to seasons and localities, from 8000 to 9500 feet, but on approaching this apparently continuous line it is found to be broken up and crossed by patches of brilliant vegetation, the limit of which appears to be want of soil rather than severity of climate. Few flowering plants extend above 10,000 feet, but they have been found as high as 12,000 feet. At this great elevation two species of quadrupeds may be seen, the bouquetin or wild goat, and the chamois, which delight in heights inaccessible to man. The bouquetin, which has become very rare, scales the most elevated peaks, while the chamois is generally found rather lower, but is never seen in the plains. In summer the high mountain pastures are covered with large flocks of cattle, sheep, and goats, which are, in winter, removed to a lower and warmer level. The marmot, and white or Alpine hare, inhabit both the snowy and the woody regions. Lower down are found the mole, the wild-cat, the fox, the lynx, the bear, and the wolf; but the last two are now extremely rare. The vulture, eagle, and other birds of prey frequent the rugged Alpine rocks, and 'the snowy ptarmigan' seeks food and shelter among the diminutive plants that border upon the snow-line. Other kinds of game, including the grouse, woodcock, and partridge, may be found from the upper limit of the woods to the more level and habitable parts below. Several kinds of water-fowl frequent the higher lakes, where excellent trout and other fish are found; but those situated at the greatest elevation are, from their low temperature, entirely destitute of fish.

Geology and Minerals.—The geological structure of the Alps is highly involved, and is far, as yet, from being thoroughly investigated or understood. In general three zones can be distinguished, a central, in which crystalline rocks prevail, and two exterior zones, in which sedimentary rocks predominate. The rocks of the central zone consist of granitic gneiss of various forms, seldom pure granite, gneiss, hornblende, mica slate, and other slates and schists. In the western Alps there are also considerable elevations in the central zone that belong to the Jurassic (Oolite) and cretaceous formations. From the disposition of the beds, which are broken, tilted, and distorted on a gigantic scale, the Alps appear to have been formed by a succession of disruptions and elevations extending over a very protracted period. The large beds of calcareous rock which overlie the older rocks both to the east and west appear to have been ruptured and rolled back by the upheaval of the central mass. Mining is not carried on to an extent proportionate to the magnitude of the mountain range. Iron and lead, however, are found in considerable abundance, and the Bleiberg (lead mountain) mine, in Carinthia, furnishes the purest lead in Europe. Rock-salt is abundant towards the north of the chain, and the salt-works of Bex in Canton de Vaud, of Hall in Tyrol, of Hallein and Berchtesgaden in the vicinity of Salzburg, are of note. Mercury exists chiefly in the east part; the richness of the mine of Idria, north-west of Trieste, is well known. Besides those principal products, gold, silver, copper, zinc, alum, and coal are wrought to some extent.

ALPUJARRAS, a mountain district of Spain, in Andalusia (provinces of Granada and Almeria), extending about 50 miles west to east, between the Sierra Nevada and the coast range. The highest peaks, about 6570 feet high, are covered with snow three-fourths of the year. The mountains are rugged and bare, but the valleys are rich and well cultivated, yielding grain, vines, olives, and other fruits; and there are forests of oak, beech, pine, and other trees. Cattle, sheep, goats, and mules are reared. The inhabitants are Christianized descendants of the Moors. The district is watered by the Almeria, Adra, and numerous smaller streams. Some lead, antimony, and silver are obtained. The chief town is Ugijar.

ALSACE (German, *Elsass*: French, *Alsace*), before the French revolution a province of France, on the Rhine, afterwards constituting the French departments of Haut and Bas Rhin, and subsequently to the Franco-German war of 1870–71 reunited to Germany, and incorporated in the province of Alsace-Lorraine. Alsace is generally a level country, though there are several ranges of low hills. The principal river is the Ill. The hills are richly wooded. Corn, flax, tobacco, grapes, and other fruits are grown. The total area is 3200 square miles; the population in 1900 was 1,154,641. It is divided into Ober-Elsass (capital Colmar) and Unter-Elsass (capital Strasburg). Alsace was anciently a part of Gaul. It was held by the Romans for 500 years, and from them it passed to the Franks. In the time of Otto I. it was transferred from France to Germany, and became a dukedom under the empire. In 1268, the line of its dukes becoming extinct, it was parcelled out to several members of the German Empire. By the peace of Münster, in 1648, the part of Alsace belonging to Austria, and to ten free cities of the empire, was ceded to France. The rest of Alsace still preserved its connection with the Empire. By the peace of Ryswick, in 1697, Strasburg, and the territory occupied by France on the left of the Rhine, were ceded to France.

Henceforth, till their recent successes, the Germans used to look with longing eyes on Alsace. The inhabitants of Alsace continue to speak German, and are generally said to retain German sympathies. Strasburg is the chief city. The chief productions are wine, copper, iron, hemp, flax, tobacco, madder, &c.

ALSACE-LORRAINE, a province (Reichsland, 'imperial territory') of Germany, on the east of France, partly bounded by the Rhine; area, 5600 sq. miles, of which Alsace occupies 3198, and Lorraine 2402. It is under a lieutenant-governor, and is divided into the districts of Lower and Upper Alsace and Lorraine, at the head of each being a president. The chief towns are Strasburg, Mülhausen, and Metz. Pop. in 1900, 1,717,451, 76 per cent being Catholics, and 21·7 per cent Protestants.

AL SEGNO (Italian, 'to the mark or sign'), in music, an expression which is usually accompanied with this character, 𝄋, and signifies that the performer is to return to a similar mark in the composition, and end with the first part of the strain.

ALSEN, an island of Prussia, in the Duchy of Schleswig, situated on the Little Belt, and separated from the coast by a narrow channel named Alsensund; length, 20 miles; breadth, from 5 to 7 miles. It contains two considerable towns, Sonderborg and Norborg. It is diversified with forests, lakes, well-cultivated fields, and orchards. Pop. 25,000.

ALTAI MOUNTAINS, the name roughly given to a vast extent of mountain chains between the table-land of Central Asia and the low plains of Siberia, but more correctly applied to several ranges lying between lat. 49° and 56° N., and between lon. 82° and 89° E. Thus understood they cover an area of about 50,000 miles, mostly comprised in the government of Tomsk. The rivers of this region, which are large and numerous, for the most part flow into the main branch of the Obi. Clay-slate, chlorite-slate, and mica-slate are the prevailing rocks in the more elevated regions, and they have been heaved up and contorted by granite, syenite, &c. Limestones are abundant, and sandstones rich in fossils. The diluvial formation almost surrounds the Altaï on three sides. The mountain scenery is generally grand and interesting. The peak called Byelucha is supposed to be the highest of the Altai mountains. Its height has been estimated at 14,890 feet. The area covered by perpetual snow is very considerable, and glaciers occupy a wide extent, but they seldom descend far below the snow-line. In the high lands the winter is very severe; the frost does not disappear till the middle of May, and in the mountains the ice of the lakes may frequently be crossed on horseback in the middle of June. The vegetation is varied and abundant. The mountain forests are composed of birch, alder, aspen, acacia, fir, larch, and the Siberian stone-pine; the last mentioned flourishes at the height of 7000 feet. The wild sheep has here its native home, and several kinds of deer occur. The most important of the mineral productions are gold, silver, copper, and iron. A number of the inhabitants are Kalmuks, but the Russian colonists are now far more numerous.

ALTAMURA, a town of South Italy, in the province of Bari delle Puglie, at the foot of the Apennines, 29 miles south-west of Bari. From the number of vases and other remains found near it it is supposed to occupy the site of the ancient Lapazia. It is walled, well built, and contains a magnificent cathedral, founded by the Emperor Frederick II., and a college and hospital, founded by King Charles of Bourbon. Pop. (1901), 22,729.

ALTAR (L. *altare*, from *altus*, high) means literally a raised or elevated structure, and was applied by the Romans to the structures on which sacrifices were offered to their gods. The Greek and Roman altars were various in form, and often highly ornamental. In the Jewish ceremonial the altar held an important place, and was associated with many of the most significant rites of religion. Two altars were erected in the tabernacle in the wilderness, and the same number in the temple, according to instructions given to Moses in Mount Sinai (Ex. xxvii. and xxxvii. 25—xxxviii. 7). These were called the altar of burnt-offering and the altar of incense. In the Christian church the term was applied to the eucharistic table, or that used in dispensing the communion. Originally it was probably a simple table, as representing the table used at the institution of the eucharist. Subsequently altars were very commonly made of stone, and many of them became highly elaborate structures. The regular place for the altar is in the east end of the church, but this was not always so. When there is more than one in a church the principal altar is called the *high* altar. In the Church of England some object to the communion table being called an altar.

ALTENA, a town of Prussia, in Westphalia, in the government of Arnsburg, in a deep valley on the Lenne, 40 miles N.N.E. of Cologne. There is here an old castle, formerly the residence of the counts of Mark. In the town and neighbourhood there are extensive wire-works, iron and steel rolling-mills, chain-works, as well as numerous manufactories of needles, pins, thimbles, and smaller articles of iron, brass, and bronze ware. Pop. (1900), 12,769.

ALTENBURG, or more properly SAXE-ALTENBURG, a duchy forming one of the states of the German Empire, surrounded by the Kingdom of Saxony, the Prussian province of Saxony, the grand-duchy of Weimar, the duchy of Meiningen, the principality of Rudolstadt, and the lordship of Gera (Reuss-Schleiz), which divides it into two nearly equal parts—an east, consisting of Altenburg and Ronneburg, and a west, of the circle of Saal-Eisenberg. The far larger population belongs to the former division, because it is fertile and well cultivated, while the other is rugged and sterile. The population is of Slavonic origin, though the language is German. The rule here prevails that the youngest son is heir to the landed property of his father. The revenue of the state amounts to about £132,000. It sends one member to the Bundesrath and one to the Reichstag of the Empire. The area is 510 square miles. Pop. (1905), 206,508.

ALTENBURG, a town of Germany, capital of the above-mentioned duchy, situated in a fertile district, 26 miles south of Leipzig. It is irregularly built, but has some fine streets and many handsome edifices, including a palace on a commanding height in the midst of extensive gardens. Altenburg has an active trade in woollen yarns, colonial goods, and grain, and manufactures of cigars, tobacco, woollen yarn, gloves, hats, mathematical instruments, glass, brushes, and beer. Pop. in 1905, 38,818.

ALTERATIVES, a term applied to medicines the action of which is only slightly, if at all, manifested outwardly, by producing unwonted excretions. Powerful medicines, such as mercury or iodine, if administered in small doses, may act in this way, their effect being produced by a very gradual process. The term is therefore descriptive not of a particular class of medicines, but of the way in which they are employed.

ALTER EGO (Latin, 'the other I'), applied to one who represents another in every respect. This term was formerly given, in the official style of the Kingdom of the Two Sicilies, to a substitute appointed by the king to manage the affairs of the kingdom, with full royal power.

ALTHÆA. See HOLLYHOCK and MARSH MALLOW.

ALTITUDE, in mathematics, denotes the perpendicular height of the vertex of any plane or solid body above the line or plane of its base; thus the altitude of a triangle is measured by a perpendicular let fall from any one of its angles upon the base, or upon the base produced; therefore the same triangle may have different altitudes, accordingly as we assume one side or another for its base. Again, the altitude of a cone or pyramid, whether right or oblique, is measured by a perpendicular let fall from the vertex to the plane of its base. Similar remarks apply to other solids. In astronomy altitudes are measured or estimated by the angles subtended between the object and the plane of the horizon; and this altitude may be either *true* or *apparent*. The *apparent* altitude is that which is obtained immediately from observation; and the *true* altitude that which results from correcting the apparent altitude, by making allowance for parallax, refraction, &c. The altitude of a terrestrial object is the height of its vertex above some horizontal plane assumed as a base. As to the measurement of the altitudes of mountains, see HEIGHTS (MEASUREMENT OF).

ALTO. See CONTRALTO.

ALTON, a market-town of England, in Hampshire, about 16 miles north-east of Winchester, and 46 miles south-west of London, a station on the South-Western Railway. It consists of one principal street, about ½ mile long, three small streets, and a spacious market-place, all clean and well-kept. The houses are mostly of brick, although there are quarries of good building-stone in the neighbourhood. There is a handsome parish church, with a square embattled tower and spire, and several other places of worship, a market-house, and a mechanics' institute. Sacking and hop bagging are made to a certain extent, and there are two large breweries, the ale from which is much esteemed, and a paper-mill. Pop. in 1871, 4092; in 1901, 5479.

ALTON, a town of the United States, in Illinois, on the east bank of the Mississippi, near the junction of the Missouri with that river, and 180 miles west of Washington. Its streets are spacious and regularly laid out. It is favourably situated for commercial purposes, being the central point of several lines of railway diverging from it in every direction, and it has the best landing for steam vessels on the east bank of the Mississippi. There are here a state penitentiary, several mills and manufactories, and in the neighbourhood a plentiful supply of limestone and coal. Pop. (1890), 10,294; (1900), 14,210.

ALTONA, an important commercial city in the Prussian province of Schleswig-Holstein, beautifully situated on the right bank of the Elbe, surrounded by gardens and villas, on the west of and adjoining Hamburg, with which it practically forms one city. It is built on the side of a hill, which gives it the appearance of an amphitheatre when viewed from the direction of the Elbe, and has a fine street called Pall Mall, with a shady walk formed by a double row of lime-trees in its centre; a beautiful high church with two towers, a gymnasium with a library, and a cemetery containing the tomb of Klopstock. The commerce, both inland and foreign, is considerable. The city enjoys many privileges, and has an exchange, an infirmary, an asylum for the poor, a fine concert-hall, barracks (formerly occupied as the mint), a gymnasium, real-school, royal school of navigation, school of farriery, various other schools, a museum, an observatory, hospitals for infants, lying-in hospital, and many other charitable institutions. It does an extensive trade with England, France, the Mediterranean, and America. The manufactures include cotton and woollen goods, tobacco, sugar, soap, &c. In 1713 Altona was almost totally burned by the Swedish general Steenbock. Its railway connections add much to its trade and importance. Pop. in 1875, 84,218; in 1905, 168,320.

ALTOONA, a town of the United States, in Pennsylvania, at the eastern base of the Alleghanies, 244 miles west of Philadelphia, with which it is connected by rail. It has large machine shops and locomotive factories connected with the Central Railway. Pop. (1890), 30,337; (1900), 38,973.

ALTORF, a town of Switzerland, capital of the canton of Uri, beautifully situated, near the Lake of Luzern, amid gardens and orchards, and memorable as the place where Tell is said to have shot the apple from his son's head. A colossal statue of Tell now stands here, and a stone fountain is said to mark the spot where the shooting took place. About thirty steps from this stands an ancient tower, covered with frescoes representing the exploits of Tell and the battle of Morgarten. The town possesses the oldest Capuchin monastery in Switzerland, a nunnery, and a church with a Nativity painted by Van Dyck. Pop. 2724. Near the town is the village of Bürglen, Tell's supposed birthplace.

ALTO RILIEVO. See BASS-RELIEF.

ALTRANSTÄDT, a village of Saxony, famous for the treaty concluded between Charles XII., king of Sweden, and Augustus, elector of Saxony, September 24, 1706, by which the latter resigned the crown of Poland. After the defeat of Charles at Poltava, Augustus, August 8, 1709, declared the Peace of Altranstädt void, because his commissioners, Von Imhof and Pfingsten, had exceeded their powers in signing the conditions.

ALTRINGHAM, or ALTRINCHAM, a town of England, in Cheshire, giving name to a parl. div. of the county. It lies 8 miles south-west of Manchester, and 25 miles east of Liverpool, and is remarkably neat and clean, on which account and the salubrity of its air it is much resorted to by invalids from Manchester. One of the chief employments of the labouring classes is market-gardening, the fruit and vegetable markets of Manchester being chiefly supplied from this neighbourhood. There are also manure-works, an iron-foundry, saw-mills, and a considerable trade. Pop. in 1871, 8478; in 1881, 11,249; in 1891, 12,424; in 1901, 16,831.

ALTWASSER, a thriving manufacturing village and watering-place of Prussia in Silesia, 35 miles south-west of Breslau. It contains a fine newly-erected castle, famous porcelain manufactories, machine shops, iron-foundries, and manufactures of yarn, mirrors, &c. There are several alkaline and chalybeate springs here, and the baths which have been established at them are much resorted to. Pop. (1885), 8672; (1900), 12,700.

ALUM. Common alum is a double sulphate of potassium and aluminium with a certain quantity of water of crystallization. It crystallizes in regular octahedrons, which are generally truncated on their edges and solid angles. Alum may also be formed by substituting either soda or ammonia for the potash, without at all altering its crystalline form or its taste. It dissolves in five parts of water at 60° F., and the solution reddens vegetable blues. Exposed to heat it undergoes a watery fusion, and becomes light and spongy, in which condition it possesses slightly corrosive properties, and is used as a caustic, under the name of *alumen exsiccatum*. The simplest process by which alum is prepared is perhaps that adopted at Tolfa, not far from Rome, in the manufacture of the Roman alum, as it is called. It is extracted from alum-stone (which see), which is found here in abundance. The stone is broken into small pieces, and is

loosely built up over a wood fire. When sufficiently roasted it is placed in rows between trenches filled with water, with which it is sprinkled so frequently as to be kept continually moist. It is no time in falling to powder, which, when the pulverization has proceeded far enough, is thrown into a leaden boiler filled two-thirds with water and boiled. The fire is then removed, the earthy matter allowed to settle, and the liquid run out into square wooden boxes, on the sides and bottom of which the alum crystallizes. The Roman alum is highly esteemed. Alum is made in Great Britain at Whitby from alum-slate, which there forms miles of cliffs, and at Hurlet and Campsie, near Glasgow, from bituminous alum-shale and slate-clay obtained from old coal-pits. At Whitby the alum-slate is roasted with coal; but in Sweden, where the alum-slate contains more combustible matter, it forms the fuel for itself. The shales of Scotland contain a sufficient quantity of bituminous matter to burn themselves when once combustion is properly commenced. The roasted ore is next put into reservoirs containing water, by which means a liquid strongly impregnated with sulphate of aluminium and sulphate of iron is obtained. The sulphate of iron is now decomposed by means of chloride of potassium, whereupon sulphate of potassium and chloride of iron are formed. When the liquid is sufficiently evaporated and allowed to cool, the sulphate of potassium and the sulphate of aluminium together with the water form crystals of alum, while the chloride of iron remains in the *mother-liquor*. The alum crystals are not yet quite free from iron, however, and require to be redissolved and recrystallized before pure alum is obtained. Ammonia-alum is prepared in a similar manner, ammonium chloride being added to the lixiviated burned shale in place of potassium chloride. Potash alum has the formula $K_2SO_4 . Al_2O_3 . (SO_3)_3 . 24H_2O$; ammonia-alum the formula $(NH_4)_2SO_4 . Al_2O_3 . (SO_3)_3 . 24H_2O$, and so with sodium-alum. (See ALUM-SLATE and ALUM-STONE.) The importance of alum in the arts is very great, and its annual consumption is immense. It is employed to increase the hardness of tallow, to remove greasiness from printers' cushions and blocks in calico manufactories, and to render turbid waters limpid. In dyeing, it is used to cleanse and open the pores on the surface of the substance to be dyed, and, by the attraction of the colouring matter for the alumina it contains, to render it fit for receiving the colouring particles. Wood and paper are dipped in a solution of alum to render them less combustible. Paper impregnated with alum is useful in whitening silver, and in silvering brass without heat. It is also largely used in the composition of crayons, in tannery, and in medicine.

Native alum is found in some countries in the state of an efflorescence or mould upon the surface of certain slate-clays and lavas, and in the United States in mica-slate rocks; also in delicate hair-shaped fibres occupying clefts in a bituminous shale, principally found in Italy. It may always be easily recognized by its sweetish, astringent taste, in which it resembles artificial alum. It exists only in quantities so very limited that it is of no practical use. *Soda-alum* (in which soda takes the place of potash) has been discovered native near the foot of the Chilian Andes, and *ammonia-alum* has been found in brown coal in Bohemia. Soda-alum also occurs native in Japan.

ALUMBAGH, a domain in India formerly belonging to one of the princes of Oudh, about 4 miles south of Lucknow, near the road to Cawnpore. It comprised a beautiful palace, a mosque, a temple, and other buildings surrounded by a garden, all in the centre of a magnificent park inclosed by a lofty wall with turrets at each angle. On the outbreak of the Indian mutiny this place was occupied by the revolted Sepoys, and converted into a fort. On the 23rd of September, 1857, it was captured by the British, then on their way to relieve Lucknow. Leaving a garrison of 300 European troops, together with the sick and wounded and about 4000 native camp-followers, the main body, under Outram, Havelock, and Neill, pushed on to Lucknow. These generals were unable to send reinforcements, but at the end of November the place was relieved by Sir Colin Campbell. The latter left Sir James Outram, with a force of 3500 men, to hold the Alumbagh, a task which he successfully accomplished, though repeatedly attacked by overwhelming numbers of the rebels. In March, 1858, the garrison was finally relieved. At the foot of a tree within the grounds Sir Henry Havelock was buried.

ALUMINA (Al_2O_3), the single oxide of the metal aluminium. As found native, crystallized, it is only second to the diamond in hardness. The transparent varieties are the sapphire and ruby, the opaque are corundum and emery, only the corundum being pure. In combination with silica it is one of the most widely distributed of substances, ranking in this respect next to oxygen and silicon. It enters in large quantity into the composition of granites, traps, slates, schists, clays, loams, and other rocks. The hydrated oxide, $Al_2O_3 . H_2O$, occurs as diaspore, and with ferric oxide as bauxite. Various aluminates occur in certain gems, as in spinel and chrysoberyl. Alumina may be obtained by adding a solution of ammonium chloride to purified alum dissolved in twenty parts of water, thoroughly washing the very gelatinous precipitate formed, and then drying it carefully. It may also be prepared by igniting powdered aluminium in air or oxygen. Alumina is a white powder, without taste or smell, and infusible, except in the oxyhydrogen flame. It is the basis of porcelain, pottery, bricks, and crucibles; and it has a strong affinity for oil and colouring matter, which causes it to be employed in the state of clays as a cleansing powder, and in a state of purity in the preparation of the colours called lakes, in dyeing and calico-printing. It combines with the acids, and forms numerous salts, the most important of which are the sulphate (see ALUM) and the acetate. The latter salt is formed by digesting strong acetic acid (vinegar) with the newly precipitated earth; but for the use of the manufacturer, by decomposing alum with acetate of lead (sugar of lead), or, more economically, with acetate of lime, a gallon of which, of the specific gravity 1·050, is employed for every $2\frac{3}{4}$ lbs. of alum. The sulphate of calcium formed falls to the bottom, and the acetate of aluminium remains in solution with an excess of alum, which is necessary to prevent its decomposition. It is of extensive use in calico-printing and dyeing, as a mordant, and is employed in the place of alum, to which it is generally preferred.

ALUMINIUM (symbol Al, atomic weight 27·04), a metal discovered in 1827, but long of little industrial importance owing to the difficulty of obtaining it. It is nowhere found native, though as the base of alumina (which see) it is abundantly distributed. Formerly the chief source of the metal was the mineral cryolite, but it is now manufactured mostly from bauxite clay obtained at various places. Aluminium is a shining white metal, of a colour between silver and platinum. It is very light, weighing less than glass, and about one-fourth of silver (specific gravity, 2·56 cast, 2·67 hammered). Aluminium does not tarnish nor undergo oxidation in the air. It is very ductile and malleable, and remarkably sonorous. It forms several useful alloys with iron and copper; one of the latter much resembles gold, and is made into cheap trinkets.

Spoons, tea and coffee pots, cooking utensils, dish-covers, musical and mathematical instruments, trinkets, &c., are made of aluminium. As the cost of production of this metal has now been greatly reduced, the agency being electricity, generally produced by means of water-power, it is becoming of much importance in many ways, not only by itself but also in alloys. For many purposes it is taking the place of brass or copper, and its lightness combined with its strength is a great point in its favour. See SUPPLEMENT.

ALUM-ROOT, a name in America for two plants with astringent roots: 1. *Geranium maculatum*, or spotted cranesbill, employed successfully as a remedy in dysentery among children; the tincture is recommended in cases of ulcerated sore-throat, soreness of the gums, &c. The plant contains large proportions of gallic acid and tannin. 2. *Heuchera Americana* (nat. order Saxifragaceæ) is a downy plant with rough scapes and leaves, the latter are on long petioles, 5-7-lobed, toothed; the calyx is 5-cleft, petals undivided, five stamens, the styles are remarkably long. It contains tannin and is used in preparing a wash for wounds, ulcers, &c.

ALUM-SLATE, a slaty rock of different degrees of hardness; colour grayish, bluish, or iron-black; often possessed of a glossy or shining lustre. It is chiefly composed of clay (silicate of alumina), with variable proportions of sulphide of iron (iron pyrites), lime, bitumen, and magnesia. It is found abundantly in most European countries, and from it is obtained the largest part of the alum of commerce. The process by which the alum is extracted is described in the article ALUM.

ALUM-STONE, a mineral of a grayish or yellowish-white colour, fine grained, and approaching to earthy in its composition, and filled with numerous small cavities. It may be scratched with the knife, and easily reduced to fragments. When strongly heated it emits sulphur dioxide gas. In its pure crystallized state it has the composition expressed by the formula $K_2Al\,2\,SO_4, 2\,Al(HO)_3$. It is found at several places in secondary rocks, and from it is obtained a very pure alum, by simply subjecting it to roasting and lixiviation.

ALUNNO, NICCOLO, whose real name appears to have been Niccolo di Liberatore, and who is sometimes also called Niccolo of Fuligno, an Italian painter of the fifteenth century, who may be said to be the founder of the Umbrian School. His first work, a Madonna with Angels and Saints (dating from 1458) is to be seen above the high altar of the Franciscan Church at Diruta. He painted several of the banners used in religious processions in various Italian towns, among which may be mentioned the gonfalon in the church of Santa Maria Nuova at Perugia. It is a remarkably beautiful painting, and is characterized by deep feeling and exquisite grace. He painted for the church of La Bastia in 1499 a picture representing the Virgin between two angels, which is still in a tolerable state of preservation. Unfortunately this cannot be said of his celebrated altar-piece for the cathedral of Assisi. This picture represented a Pietà between two angels bearing torches and weeping so naturally (according to Vasari) that no artist could have drawn them better. All his productions are characterized by depth of feeling, purity, and devout faith, but he cannot be entirely freed from the charge of occasional exaggeration.

ALURED, or ALFRED, an ancient English annalist, born about 1100; studied, according to some authorities, with great distinction at Cambridge, and after spending some years in travelling in France and Italy became canon and treasurer of the church of St. John of Beverley, his native town. His Annals, which begin with the legendary period of British history, come down to his own times in the year 1129, and are valuable both on account of the matter and the manner in which they are written. He is also supposed to be author of The History of St. John of Beverley, a MS. preserved in the Cottonian Library.

ALVA, a town of Scotland, in the county of Clackmannan, 7 miles north-east of Stirling, and formerly in a detached portion of that county, surrounded by Clackmannan and Perthshire. It is pleasantly situated on nearly level ground at the base of a hill called Craigleith, and has extensive manufactures of woollen goods, particularly shawls, plaids, and tweeds. Pop. in 1881, 4961; in 1891, 5225; in 1901, 4624.

ALVA, or ALBA, FERDINAND ALVAREZ, OF TOLEDO, DUKE OF, minister of state, and general of the imperial armies, was born in 1508, of one of the most illustrious families of Spain. He was educated under the eyes of his grandfather, Frederick of Toledo, who instructed him in military and political science. He carried arms, when very young, at the battle of Pavia; commanded under Charles V. in Hungary; also at the siege of Tunis and in the expedition against Algiers. He defended Perpignan against the dauphin, and distinguished himself in Navarre and Catalonia. His cautious character and his inclination for politics at first led men to believe that he had but little military talent; and Charles V. himself, whom he advised, in Hungary, to build a bridge of gold for the Turks rather than risk a decisive battle, deemed him unqualified for high commands, and intrusted him with important offices rather from personal favour than respect for his ability. His pride was offended at the low estimation in which he was held, and his genius roused to the performance of exploits deserving of a permanent remembrance. His able generalship gained, in 1547, the battle of Mühlberg, against John Frederick, elector of Saxony. The elector was taken prisoner, and the duke, who presided in the council of war, adjudged him to death, and strongly urged the emperor to execute the sentence. In 1555 he was commissioned to attack the French in Italy, and Pope Paul IV., the irreconcilable enemy of the emperor. He gained several victories, relieved Milan, advanced to Naples, where the intrigues of the pope had stirred up a rebellion, and confirmed there the Spanish influence. When Charles V. resigned the government to his son, Philip II., Alva received the supreme command of the army. He conquered the States of the Church and frustrated the efforts of the French. Philip, however, compelled him to contract an honourable peace with the pope, whom Alva wished to humble. Recalled from Italy he appeared, in 1559, at the French court in order to marry Elizabeth, the daughter of Henry II., by proxy, for his sovereign; she had been at first destined for the crown-prince, Don Carlos. About this time the Netherlands revolted and Alva advised the king to suppress the insurrection by severity and force. The king intrusted him with a considerable army and unlimited power to reduce the rebellious provinces. Scarcely had Alva reached Flanders at the end of August, 1567, when he established the Council of Blood, at the head of which stood his confidant, Juan de Vargas. This tribunal condemned, without discrimination, all whose opinions were suspected, and whose riches excited their avarice. The present and absent, the living and the dead, were subjected to trial, and their property confiscated. Many merchants and mechanics emigrated to England; more than 100,000 men abandoned their country; others resorted to the standard of the proscribed Prince of Orange. The cruelty of Alva was increased by the defeat of his lieutenant,

the Duke of Aremberg, and he caused the Counts of Egmont and Horn to be executed. He afterwards defeated the Count of Nassau on the plains of Gemmingen. Soon after, the Prince of Orange advanced with a powerful army. The young Frederick of Toledo sent to his father asking permission to attack the prince. The duke, who demanded blind obedience from his inferiors, answered, that he pardoned him on account of his inexperience, but bade him beware of pressing him further, for it would cost the life of any one who should venture on a similar message. The Prince of Orange was forced to withdraw to Germany. The duke stained his reputation as a general by new cruelties; his executioners shed more blood than his soldiers. The pope presented him with a consecrated hat and sword, a distinction previously conferred only on princes. Holland and Zealand, however, resisted his arms. A fleet which was fitted out at his command was annihilated, and he was everywhere met with insuperable courage. This, and perhaps the fear of losing the favour of the king, induced him to request his recall. Philip willingly granted it, as he perceived that the resistance of the Netherlands was rendered more obstinate by these cruelties, and was desirous of trying milder measures. In December, 1573, Alva proclaimed an amnesty, resigned the command of the troops to Louis de Requesens, and left the land, in which he had executed 18,000 men, as he himself boasted, and kindled a war that burned for sixty-eight years, cost Spain 800,000,000 dollars, its finest troops, and seven of its richest provinces in the Low Countries. Alva was received with distinction in Madrid, but did not long enjoy his former credit. One of his sons had seduced one of the queen's ladies of honour under a promise of marriage, and was for that reason arrested; his father assisted him to escape, and married him to one of his relations, contrary to the will of the king. Alva was banished, in consequence, from the court to his Castle of Uzeda. Here he lived two years, when the troubles stirred up by Don Antonio, prior of Crato, who had been crowned King of Portugal, forced Philip to have recourse to Alva, as one in whose talents and fidelity he placed great reliance. Alva led an army into Portugal, gained two battles in three weeks, drove out Don Antonio, and reduced all Portugal, in 1581, to subjection to his sovereign. He made himself master of the treasures of the capital, and permitted his soldiers to plunder the suburbs and surrounding country with their usual rapacity and cruelty. Philip was displeased at this, and desirous of instituting an investigation into the conduct of his general, who was, moreover, charged with having applied the wealth of the conquered to his own purposes. But a haughty answer from the duke, and the fear of rebellion, caused him to desist. The duke died at Thomar on January 12th, 1582, aged seventy-four years. It is said of him, that during sixty years of warfare he never lost a battle and was never taken by surprise. But pride and cruelty tarnished his renown. See Prescott's Philip the Second; Motley's Rise of the Dutch Republic, &c.

ALVARADO, Pedro de, a distinguished companion and lieutenant of Cortez, was born at Badajoz, about the end of the fifteenth century. He was of good family, his father being a knight of the order of St. James. In 1518 he crossed the Atlantic with four or five of his brothers, and accompanied Grijalva in a small expedition which was sent by Velasquez, governor of Cuba, to explore the American coast. It was in this expedition that Mexico received the name of New Spain, on account of the beauty of the country, its rich cultivation, and the advanced state of civilization of its inhabitants. A considerable amount of the precious metals was obtained by barter, and Alvarado was despatched to Cuba with this treasure, and with a report of the regions which had been explored. The sight of the gold induced Velasquez to send another expedition, and Alvarado was appointed to the command of one of the eleven vessels with which Cortez sailed from Havana in February, 1519. The principal events that follow belong to the life of Cortez; but it may be stated that at the battles of Tabasco and Otumba, and the final reduction of Mexico, Alvarado was intrusted with the most important operations, and mainly contributed to success. When Cortez was called away to meet Narvaez, who had been sent by Velasquez with a superior force to supersede him in the command, he left the capital and his royal captive, Montezuma, in Alvarado's charge. Las Casas charges the latter with an atrocious attack upon the Mexicans for the purpose of plunder during the absence of his chief, and others have repeated the same story; but it appears to be unsupported by evidence, and even to be positively contradicted by the fact that Cortez, on his return, continued to treat him with confidence. The attack seems, on the contrary, to have originated with the Mexicans, and Alvarado appears to have bravely kept them at bay until the return of his commander with reinforcements. In July, 1520, during the disastrous retreat from the capital after Montezuma had been killed by his own subjects, the perilous command of the rear-guard was assigned to Alvarado. When Cortez with the main body had passed one of the bridges, the Mexicans in their canoes destroyed it. Alvarado's horse was killed under him, he was surrounded by the enemy, and there seemed to be no way of escape for him, when with great presence of mind he made use of his long Spanish spear as a vaulting pole, and with a vigorous bound got upon the opposite bank. Many of his soldiers tried to escape in the same manner, but all perished in the attempt. The place has since been known as Alvarado's Leap. In 1523 he was sent with a considerable force to reduce the tribes of Indians in the direction of Guatemala, and having beaten off all opponents he founded a city now called Guatemala la Vieja. He also established a port on the Pacific, which he called Puerto de la Posesion. He then embarked for Spain, and was received with great honour by the Emperor Charles V., who, in acknowledgment of his services, made him Governor of Guatemala, and presented to him all the gold and valuables which he had brought over. Having formed a matrimonial alliance with a lady of an ancient and noble Spanish house, he shortly afterwards returned to America with a numerous band of knights and kinsmen, and Guatemala speedily became a prosperous city. An attempt which he subsequently made on Quito, but which he was induced to relinquish, was resented by Pizarro as an intrusion within the boundary of his command, and he embarked a second time for Spain to vindicate his conduct to the emperor. The result was the addition of the province of Honduras to his government. He returned with his wife to Guatemala; and after a short period of repose he engaged in a new expedition against the Indians, during which, in 1541, a horse climbing a bank slipped and fell upon him, crushing him so severely that he died in three days.

ALVAREZ, Don José, the greatest of modern Spanish sculptors, was born 23rd April, 1768, at Priego, in Andalusia. In his twentieth year we find him zealously studying art at the Academy of Granada. In 1794 he was elected a member of the Academy of San Fernando in Madrid, and five years later gained the first academical prize with a rilievo, which so pleased the king that he granted him a pension of 12,000 reals, in order that he might further pursue

his studies in Paris and Rome. In 1804 he produced his exquisite plaster model of Ganymede, which gained him a full share of public approval. Shortly afterwards he was engaged on a work of loftier conception, Achilles receiving the Fatal Arrow, but unfortunately the model was broken, and he could never return to the same subject. He subsequently removed to Rome, where he was commissioned by Napoleon to execute four bas-reliefs for the Quirinal Palace on Montecavallo. These reliefs, which were highly praised by his friends Canova and Thorwaldsen, were never finished, owing to the fluctuating fortune of his imperial patron. During his stay in Rome he also produced his famous group of Antilochus and Memnon, and the still more celebrated colossal group of Saragossa, now in the museum at Madrid. On his return to the Spanish capital he was appointed court sculptor by Ferdinand VII. He died at Madrid on the 26th November, 1827.

ALWAR, or Macheby, a state of Hindustan, in the north-east of Rajputana, situated between lat. 27° 4′ and 28° 13′ N.; lon. 76° 7′ and 77° 14′ E., and bounded on the north by the British district Gurgaon and the native state Kot Quasin, on the east by Gurgaon and Bhurtpore, on the south by Jeypur, and on the west by Jeypur and Jhujhur; length, north to south, about 80 miles, and breadth about 65 miles; area, 3024 square miles. The surface is generally elevated and rugged, one or more of the summits rising to a height of 2000 feet above the sea. The general level, however, is at least 1000 feet lower, and the far greater part of the drainage is carried into a valley watered by the Sabhí, which flows N.N.E. and joins the Jumna. Though much of the territory is of an arid description, water is generally found on the plains by digging a little beneath the surface, and the means of irrigation being thus provided, the soil, though sandy, is highly productive. The inhabitants, known by the name of Mewattis, have long borne a bad name; but the influence of British rule, and the dread of punishment, are said to have had considerable effect in taming their predatory and turbulent disposition. This semi-independent state is under the control of the governor-general's agent for Rajputana. The revenue amounts to about £200,000; military force, about 3000 infantry and 4000 cavalry. Pop. (1901), 828,888.

ALWAR, a town of Hindustan, capital of state of same name, situated at the base of a rocky range of quartz and slate, 80 miles S.S.W. of Delhi. It is surrounded by a mud wall, of which the gates only are flanked by bastions, and it is very poorly built. The only edifices worth notice are the rajah's palace, which is of a cubical form, and has its wall pierced with numerous small windows, and decorated with rude and glaring paintings; a pavilion of white marble, built by the late Rao Rajah, near a very deep tank which he had executed, and displaying no small degree of taste; and several Hindu temples, in a style imitated from Mohammedan structures. A fort, crowning the lofty mountain which overhangs the town, is highly ornamented, and serves the rajah both as a summer palace and as an asylum in times of danger. Pop. (1891), 52,398; (1901), 56,740.

AMADEUS, the name of several counts of Savoy. The first who bore it was the son of Humbert I., and succeeded him in 1048, dying about 1078. The others of this name who have occupied an important place in history are the following:—Amadeus V., surnamed the *Great*, who succeeded to the sovereignty in 1285. He gained distinguished honour in defending Rhodes against the Turks. He died, after a reign of thirty-eight years, in 1323, at Avignon, where he was soliciting Pope John II. to publish a crusade in favour of Andronicus, emperor of the East, who had married his daughter. He was much loved and honoured by all the sovereigns of Europe, and was frequently the mediator in their differences. —Amadeus VIII. succeeded his father, Amadeus VII., in 1391, and acquired the titles of the *Pacific* and the *Solomon* of his age. In 1416 Savoy was made a duchy; but after this elevation Amadeus retired from his throne and family into a religious house, at a place called Ripaille. In this retreat he devoted himself to pleasure, so that *faire ripailles* became proverbial to signify a life of indulgence and exquisite gratification. Here he aspired to the papacy, and employed large sums of money at the Council of Basel to secure his election. Accordingly this council, in 1439, having deposed Eugenius IV., chose Amadeus in his place, under the name of Felix V., though he had never taken holy orders. Eugenius excommunicated him. On the death of his rival in 1440 Amadeus was persuaded to abdicate. He died at the age of sixty-nine in 1451.

AMADIS, a name belonging to a number of heroes in the romances of chivalry, Amadis de Gaul being the greatest among them, and represented as the progenitor of the whole. He is represented as having been son of King Perion of France, and Eilesena, daughter of King Gavinter of Bretagne. The question as to the origin of the cycle of romance connected with these heroes is involved in so much darkness that it is even doubtful whether it originated with the Spanish, the Portuguese, or the French. In the Spanish original the series of romances is contained in thirteen books, of which Cervantes, in the well-known examination of the library of Don Quixote, thought the first four worthy of being preserved, because they were not only the first, but also the best and only books of this kind which Spain had produced; but the others were committed to the flames. These four contain only the history of Amadis de Gaul. It is now a common opinion that they were written about 1370 by Vasco Lobeira of Oporto, himself a gallant knight, who died in 1403, and that the Portuguese original is now lost. Garcias Ordoñez de Montalbo, who prepared the Spanish edition of the original four books, is said to have been the author of the fifth book, which contains the history of Esplandian, the eldest son of Amadis. The subsequent books of the Spanish edition were added by various hands, and these were still further added to when the work was translated into other languages. Thus in Germany they increased to the number of thirty. The separate parts of this work, which are seldom all found together, are of very various degrees of merit. The additions are by no means equal to the four first books. An abridged English translation of the romance of Amadis of Gaul was published by Southey in 1803; it was poetically treated by W. Stewart Rose in his Amadis de Gaul, a Poem in three Books (London, 1803).

AMADOU. See German Tinder.

AMALEKITES, a nomadic race occupying the peninsula to the north of Arabia, between Egypt and Palestine. They are mentioned in the Bible and in the traditions of the Arabs, but from the latter source little information is derived. Their ethnological character is unknown. In Balaam's prophecy they are described as the first of the nations (Num. xxiv. 20). In Gen. xiv. 7 the country of the Amalekites (in the Septuagint 'princes') is said to have been smitten by Chedorlaomer. A grandson of Esau was called Amalek, and there seems to have been an amalgamation to some extent between the Edomites and Amalekites, to which this circumstance may perhaps be referred. A sentence of extermination was denounced against the Amalekites by Moses on account of their hostility to the Israelites during

their journey through the wilderness (Ex. xvii. 14). Saul was commissioned by Samuel to execute the divine vengeance on the Amalekites, and for failing to accomplish the mission was sentenced to lose his kingdom; but he slew or dispersed the Amalekites and captured their king, and from this time their power seems to have been broken. Some hordes of them invaded the south of Judah towards the close of the reign of Saul, and they were repeatedly defeated and slaughtered by David. After this there is little mention of them.

AMALFI, a seaport town in Southern Italy, situated on the Gulf of Salerno, about 23 miles south from Naples. It occupies an extremely picturesque position, extending over the summits of a series of lofty rocks, still crowned with embattled walls and ruined towers. The cathedral, dedicated to St. Andrew, is the only building of interest in the city. In the ninth century the town rose to great splendour, assumed the form of a commonwealth, and for its zealous exertions against the Saracens was distinguished by the title of Defender of the Faith. After enjoying its republican constitution and commercial rank for nearly 300 years it was attacked and plundered by Robert Guiscard, the Norman conqueror, in 1075, and again by the Pisans in 1130, on which occasion the latter found a famous MS. of the Pandects of Justinian. From this date Amalfi fell into decline, and now presents a sad contrast to its former grandeur. It is the birthplace of Flavio Gioja, to whom is wrongly ascribed the invention of the mariner's compass, and of Masaniello, the fisherman of Naples. Pop. 7000

AMALGAM, a name applied to the alloys of mercury with the other metals. See MERCURY.

AMALIA, ANNA, Duchess of Saxe-Weimar, born October 24, 1739, daughter of Charles, duke of Brunswick-Wolfenbüttel. During the latter half of the eighteenth century this princess, who was left a widow in the second year of her marriage (1758), was the centre of a court which, in more than one respect, resembled that of the Duke of Ferrara, which was adorned by the presence of Tasso and Ariosto. She gave to learned men the support which they looked for in vain from the great princes of Germany, while she afforded them a point of union and an agreeable residence. She governed with wisdom after the death of her husband, and till she resigned her authority into the hands of her son Charles Augustus, the friend and patron of Goethe, in 1775. She possessed considerable musical talent, and composed pieces for the church and the theatre. She died in 1807, it is said, of a broken heart, caused by the unfortunate issue of the battle of Jena.

AMALTHÆA, in Greek mythology, the name of a goat which suckled Zeus when his mother concealed him in Crete through fear of Cronos. The horn of this goat is said to have formed the *Cornucopiæ* or horn of plenty, from which came all things needful.

AMARANTHUS, a genus of herbaceous, mostly annual plants, of the natural order Amaranthaceæ. This order consists of apetalous plants chiefly inhabiting tropical countries, and remarkable for the white or reddish scales of which their flowers are composed. These preserve their appearance after they are plucked and dried. On this account poets make the plant an emblem of immortality. The natural order contains about 300 species, one of which, the *Amaranthus caudatus*, or love-lies-bleeding, is a common plant in gardens.

AMARAPURA, a town of Upper Burmah, now forming practically a suburb of Mandalay, a little to the south of which it stands, on the left bank of the Irawaddy, 10 miles north-east of Ava. It was founded in 1783 as a new capital of the Burmese dominions, and increased so rapidly that it was said to have a population of 170,000 in 1810. In that year it was destroyed by fire, and it soon after ceased to be the capital, though in 1838–60 it again held this position. In 1839 it suffered severely from earthquake. The chief buildings are temples and pagodas, which, from their rich gildings, have a very showy appearance. The population does not now probably exceed 5000.

AMARYLLIDACEÆ, or AMARYLLIDEÆ, a natural order of monocotyledonous plants, generally bulbous, sometimes fibrous rooted, occasionally with a tall, cylindrical, woody stem. Their characteristics are a highly-coloured flower, six stamens, and an inferior three-celled ovary. They are natives chiefly of the Cape of Good Hope; but species are found in the warmer parts of Europe, in every part of South America and tropical Asia, and a few species also in Australia. Lindley divides the order into four tribes, sixty-eight genera, and 400 species. To this order belong the snowdrop, the snowflake, the daffodil, the belladonna-lily, the so-called Guernsey-lily (probably a native of Japan), the Brunsvigias, the blood flowers (Hæmanthus) of the Cape of Good Hope, different species of Narcissus, Amaryllis, Galanthus, Crinum, Agave (American aloe), &c.

AMASIA, a town in the north of Asia Minor on the banks of the Irmak, 60 miles above its mouth in the Black Sea. Its most striking object is the Acropolis, and there are numerous mosques, a well-stocked bazaar, and about twenty richly-endowed medressas (Mohammedan high schools) attended by 2000 softas, who are supported by the funds of these establishments. The trade in wine, grain, madder, cotton, and particularly silk, is considerable. Amasia gave birth to the celebrated geographer Strabo. Pop. about 25,000.

AMASIS, King of Egypt from 569 to 526 B.C., was born of parents in comparatively humble condition, at Siuph near Sais. He was appointed commander of the army by King Apries, and sent to quell an insurrection which had originated among the Egyptians owing to the royal favours bestowed on foreigners. Amasis turned his back upon his master, however, and placed himself at the head of the rebels. He defeated Apries near Momemphis, and the unfortunate king, falling into the hands of his revolted subjects, was put to death, Amasis being thereupon declared his successor. In order to resist the influence brought to bear against him by a party amongst the warrior caste, he formed a close alliance with the Greeks of Cyrene, married Ladice, a Cyrenian, and maintained an army of Greek mercenaries. He succeeded in gaining the favour of the priests and the people, and greatly encouraged trade and agriculture. He died in 526, when Cambyses was advancing to invade his kingdom.

AMATI, a family of Cremona who manufactured violins in the sixteenth and seventeenth centuries. Andrea (about 1540–1600) was the founder of the business, which was carried on by his sons Geronimo and Antonio, and by Niccolo the son of Geronimo. The most of the violins made by them (called Amati violins or Cremonas) are of comparatively small size and flat model, and the tone produced by the fourth or G string is somewhat thin and sharp. Many of Niccolo Amati's violins are, however, of a larger size and higher model, and have all the fulness and intensity of tone characteristic of those manufactured by Stradivario and Guarnerio.

AMATITLAN, a town in Central America, in the state of Guatemala. The town, about 15 miles south of the city of Guatemala, is irregularly built;

and none of the houses, which are mostly constructed of mud, have more than the ground story. It is rather a busy place, however, and can boast of such civilized institutions as coffee-houses and billiard-rooms. The inhabitants are actively engaged in the cochineal trade. There is a lake of the same name close to the town, 11 or 12 miles long, and 2 or 3 broad, containing a great abundance and variety of fish. Pop. about 12,000.

AMAUROSIS, a term derived from the Greek *amauros*, dark, denotes a particular species of blindness, formerly called gutta-serena (the 'drop serene, as Milton, whose blindness was of this sort, called it), and produced by an injury of the nerves of vision. The retina, the brain, or the connecting nerve, may each be the seat of the disease. The most frequent causes of injury are a long-continued direction of the eye on minute objects, long exposure to a bright light, to the fire of a forge, to snow, burning sands, or irritating gases; less frequent but by no means rare cases arise from over-fulness of blood, or the contrary condition, disease of the brain, indigestion, tape-worm, sexual excess, gout, &c. If taken in time it may be cured or mitigated; but confirmed amaurosis is usually incurable.

AMAXICHI, or Amakhukhi, a town, capital of Santa Maura, one of the Ionian Isles, on its east coast. It stands on a sandy, fertile plain, in the neighbourhood of unwholesome salt marshes, and is subject to frequent earthquakes. It has one wide street; houses generally of wood; and a square, in which is the governor's house, and an ancient marble statue. It is the seat of a Greek bishop, and has numerous churches, two harbours for small vessels, manufactories of cotton and leather, and a considerable trade. Pop. 5500.

AMAZON, Amazons, Maranon, or Orellana, a river of South America, the largest in the world. It is formed by a great number of sources which rise in the Andes; but the two head branches are the Tunguragua or Marañon and the Ucayale, both rising in Peru, the former from Lake Lauricocha, in lat. 10° 29′ S., the latter formed by the Apurimac and Urubamba, the head waters of which are between lat. 14° and 16° S. The general course of the river is north of east, and including its windings is upwards of 4000 miles in length. It flows into the Atlantic under the equator by a mouth which is about 200 miles wide, and is divided into two principal and several smaller arms, by the large island Marajo, and a number of smaller islands. The Tunguragua becomes navigable for vessels drawing 5 or 6 feet of water near Jaen de Bracamoras, after it has run a course of about 400 miles. At a considerable distance below this the navigation is interrupted by a number of rapids where the stream breaks through the middle chain of the Andes to enter on the vast forest-covered plains of Peru and Brazil. The last of these rapids is the Pongo of Manseriche, a narrow gully about 7 miles long, with steep rocky walls, where the stream is suddenly contracted from a breadth of 1500 feet to 300–150 feet. Henceforth, or for a distance of about 3300 miles, there is no obstruction to the navigation. The Amazon receives the waters of about 200 tributaries, 100 of which are navigable, and seventeen of these streams of 1000 to 2300 miles in length. From the north and left bank it receives the Santiago, Morona, Pastaça, Tigre, Napo, Putumayo, Japura, Rio Negro (a branch of which, the Cassiquiare, strangely enough connects it with the Orinoco), Uatama, Trombetas, &c.; from the south the Huallaga, Ucayale, Javari, Jutay, Jurua, Teffé, Coary, Purus, Madeira, Tapajos, Xingu, &c. The breadth of the main stream at Nauta, a short distance below its junction with the Ucayale 2325 miles from the sea, is three-quarters of a mile; at Tabatinga, where it enters Brazilian territory, the breadth is 1½ mile; below the mouth of the gigantic Madeira it is 3 miles wide, and where there are islands in the channel, often as much as 7. A little below the mouth of the Trombetas, at the narrows of Obidos, it contracts to less than a mile, but soon again widens out, and rolls onward in a channel of immense depth towards the ocean. The depth is naturally different at different parts of its course. From the sea to the mouth of the Rio Negro, about 750 miles in a straight line, the depth is nowhere less than 30 fathoms; higher up it varies from 10 to 12, and up to the junction of the Ucayale there is depth sufficient for the largest vessels. The rapidity of the stream is considerable, especially during the rainy season (January to June), when it is subject to great floods, being on the average 2¾ miles per hour; in some places it is 4, or even more, and in other places as low as 1 mile. There is no great fall in the river's course, Tabatinga being estimated by Spix and Martius to be at the height of 634 feet above its mouth, which would give a fall of between 4 and 5 inches a mile. Others make it less than this. The river is perceptibly affected by the tides up as far as the town of Obidos, 400 miles from its mouth. The singular phenomenon of the *bore*, or as it is called on the Amazon the *pororoca*, occurs at the mouth of the river at spring-tides on a grand scale. The waters of the ocean rush into the river in the form of huge waves 10 to 15 feet in perpendicular height, three or four of which follow each other with irresistible force. The waters of the Amazon swarm with alligators, turtles, and a great variety of fish, of which Agassiz in 1866–67 discovered 1163 species. The country through which it flows is covered with immense and impenetrable forests, which afford a haunt to a vast variety of animals, including birds of the most gorgeous plumage. The area drained by the Amazon and its tributaries is estimated at 2,300,000 square miles. This region produces an immense variety of vegetable substances, including fine rubber, drugs, dye-woods, and valuable timber trees. The products it might be made to yield by cultivation are almost innumerable, among the chief being cotton, sugar, indigo, coffee, cocoa, and tobacco. This portion of South America must at some future time support a numerous population, and the Amazon and its tributaries must be the theatre of a busy commerce. The Amazonian water system affords some 50,000 miles of river suitable for navigation. Steamers began to ply on the river in 1853, and latterly the navigation was opened up to all nations. Para is the chief seat of the trade on the river, and Manaos, situated about 1000 miles up, is also a place of active trade. About forty river, coasting, and ocean steamers now ply regularly between Para and Manaos every month, a number of them being British. The mouth of the Amazon was discovered by Yanez Pinçon in 1500, but the stream was not navigated by any European till 1540, when Francis Orellana descended it. Orellana relates, that as he sailed down the river he found on its banks a nation of armed women, who made war on the neighbouring people; and this circumstance gave the name to the river; but it is thought by some authorities that the Indian name for the lower part of the stream, Amassona (boat-destroyer, from the violence of the bore) may have suggested the fable of the Amazons to the Spanish adventurer. The river has been explored in later times by La Condamine (1743–44), Humboldt (1799), Prince Adalbert of Prussia (1842), Herndon (1850), Avé Lallemant (1858), Bates (1861), Marcoy (1866), Agassiz (1866–67), and others; and its tributaries by Hartte, Chandless, Abendroth, &c. See Herndon,

Exploration of the Valley of the Amazon (1853); Bates, The Naturalist on the River Amazons (1864); Wallace, Narrative of Travels on the Amazon and Rio Negro (1870; second edition, 1889); Matthews, Up the Amazon and Madeira Rivers (1879); Guillaume, Amazon Provinces of Peru (1888); British Consular Reports, &c.

AMAZONS, according to an ancient Greek tradition, the name of a community of women, who permitted no men to reside among them, fought under the conduct of a queen, and long constituted a formidable state. They had commerce with the men of the neighbouring nations merely for the sake of preserving their community. The male children they killed or sent back to their fathers, but they brought up the females to war, and burned off the right breast that this part of the body might not impede them in the use of the bow. Several nations of Amazons are mentioned, the most famous being those who dwelt in Pontus, on the river Thermodon, near the present Trebizond. Their queen, Hippolyta, was vanquished by Hercules. They attacked Attica in the time of Theseus. They came to the assistance of Troy under their queen, Penthesilea, who was slain by Achilles. They were long believed to be an actually existing people.

AMBASSADOR, the highest degree or rank among foreign ministers. See MINISTERS (FOREIGN).

AMBER, a semi-mineral substance of resinous composition. From chemical analysis and from geological evidence there is no doubt that it is the produce of extinct Coniferæ. It usually presents some shade of yellow in its colour, from which it sometimes passes to reddish-brown; and it often contains leaves and insects. It is brittle; yields easily to the knife; is translucent, and possessed of a resinous lustre. The specific gravity is variously stated at figures between 1·05 and 1·11; but the exact value depends on the particular specimen. Its hardness is 2–2·5, the fracture is conchoidal, and it is capable of receiving a high polish by turning it in a lathe and rubbing with whiting and water, &c. Two pieces may be united by putting linseed-oil on the fracture, and heating them while in close contact over a charcoal fire. It takes on the colours of various substances, such as indigo, when heated with a mixture of these and linseed-oil. Amber usually contains fully 80 per cent carbon, about 10½ hydrogen, fully 9 oxygen, and about ½ sulphur. It dissolves unchanged in alkalies and in chloroform, and imparts a purple colour to sulphuric acid. It burns with a yellow flame, emitting a pungent aromatic smoke, and leaving a light carbonaceous residue, which is employed as the basis of the finest black varnishes. By friction it becomes strongly electric; from which property originated the name and science of electricity, *ēlektron* being the Greek word for amber. It is found in masses from the size of coarse sand to that of a man's head, and occurs in beds of bituminous wood situated upon the shores of the Baltic and Adriatic Seas; also in Poland, France, Italy, and Denmark. It is often washed up on the Prussian shores of the Baltic, and is also obtained by fishing for it with nets. Sometimes it is found on the east coast of Britain, and in gravel-pits round London. More recently it has been found in Maryland in the United States. At Berlin a mass of amber weighing 18 lbs. is exhibited. It is employed in making mouthpieces for pipes, and various kinds of ornaments, &c. The chloroform solution has been employed to give softness to silk goods. From strongly heated amber various oils are obtained, one of which mixed with alcohol and ammonia produces the perfume *eau de luce*, which again mixed with nitric acid gives artificial musk.

AMBERG, a town of Germany, formerly the capital city of the Upper Palatinate, situated on both sides of the Vils, in Bavaria, in the midst of numerous ironworks. The town is well built, and has a considerable manufacture of glass, iron-wares, stoneware, tobacco, beer, vinegar, and arms of good quality. The principal buildings are a Gothic church of the fifteenth century, the royal palace, the town-house, the old Jesuits' college, &c. At Amberg the Archduke Charles defeated the French general Jourdan on August 24, 1796. Pop. (1900), 22,039.

AMBERGRIS, a substance derived from the sperm-whale (which see), and also found in the sea near the coasts of warm countries. Its colour is a yellowish or blackish white; it is generally brittle, and may be compressed with the teeth or nails. It melts at 62°·2 C., and is entirely dissipated on red-hot coals. It is soluble in ether, volatile oils, and partially in alcohol, and is chiefly composed of a peculiar fatty substance called ambrein. Its odour is very agreeable, and hence, in a state of alcoholic solution, it is used as a perfume.

AMBLESIDE, a small town of England, in Westmoreland, situated near the head of Windermere Lake, some 12 miles north-west of Kendal. There are here unimportant manufactures of bobbins and woollen cloth; but the town is best known for the beauty of the surrounding country, and its proximity to localities associated with Wordsworth and other well-known authors. Pop. (1901), 2536.

AMBOISE, a town of France, in the department of Indre-et-Loire, 12 miles east of Tours, on the railway between that town and Orleans, on the left bank of the Loire. Near the town is a castle in which the Huguenots, engaged in what is known as the Conspiracy of Amboise (1560), met their doom. Within the town the only building worthy of notice is the parish church of St. Denis. There are manufactures of woollen goods, files, rasps, and blistered steel. The district contains many vineyards. Pop. (1901), 4538.

AMBOYNA, AMBOINA, one of the Molucca Islands, the seat of their government, and the centre of the commerce in nutmegs and cloves; greatest length, 33 miles; greatest breadth, 10 miles; area, about 260 square miles. It is composed of two sections united by an isthmus about a mile broad. Its general aspect is beautiful, and its climate salubrious. It has been occasionally visited by earthquakes. It is covered almost throughout with forests, and affords a great variety of beautiful wood for inlaying and other ornamental work. Sugar and coffee are cultivated. The surface is generally rugged and hilly, and sometimes rises into mountains of granite. The soil in the valleys and along the shores is very fertile, but a large portion remains uncultivated. The natives of Malay origin are quiet, and not much given to crime. In 1605 Amboyna was taken by the Dutch from the Portuguese, and shortly afterwards some English factories were erected there. In 1624 the Dutch, pretending to fear conspiracy, massacred ten Englishmen and twelve other foreigners, and seized the factories. James I. and Charles I. obtained no satisfaction for this outrage, but Cromwell compelled the United Provinces to pay £300,000 as a small compensation. Amboyna was twice taken by the English, namely in 1796 and 1810, but after each capture it was restored to the Dutch, in whose possession it remains. Pop. 38,663. Amboyna is also the name of one of the residencies into which the Molucca Islands are divided, and as such includes Booro, Ceram, and certain other islands. Pop. (1895), 295,768.

AMBOYNA, the chief town of the island of the same name (see above), is situated on the east side of the Bay of Amboyna, and is well built and defended

by a citadel. The houses, built in the Dutch fashion, are generally of one story, owing to the frequency of earthquakes. It has a governor's palace, town-house, two Protestant churches, several mosques, an orphan hospital, a theatre, and a large covered market-place. The streets are spacious, and are planted on each side with rows of fruit-trees. Pop. 10,500.

AMBROSE, Saint, a celebrated father of the church; born in 333, or according to other accounts 334, probably at Treves (the ancient *Augusta Trevirorum*), where his father resided as pretorian prefect of Gallia Narbonensis. Happy omens attended him even in the cradle. A swarm of bees covered the eyes of the boy while slumbering in the court of his father's castle, and when the nurse hastened to him she was astonished to perceive the bees going in and out of his mouth without doing him any injury. His father, recollecting perhaps a similar wonder mentioned of Plato, hoped, from this circumstance, that he was destined for greatness. On the death of his father, which took place when Ambrose was still a boy, the family removed to Rome, where he studied law under Anicius Probus and Symmachus. He went to Milan, then the imperial residence, and began to plead causes, while yet a youth. His pleadings were so eloquent and skilful, that in a short time Probus, the prefect of Italy, chose him a member of his council; and in 369, with the approval of the Emperor Valentinian, appointed him governor of the provinces of Liguria and Æmilia (North Italy). His kindness and wisdom gained him the esteem and love of the people; but their prosperity was interrupted by the disturbances growing out of the doctrines of Arius, and in 374 he was called to the bishopric of Milan by the unanimous voices of Arians and Catholics. Ambrose long refused to accept this dignity, but in vain. He fled by night, and thought himself on the way to Pavia, but unexpectedly found himself again before the gates of Milan. At length he yielded, received baptism, for he had hitherto been only a catechumen, and eight days after was consecrated a priest. The 7th of December is still celebrated by the church on this account. Immediately after his elevation to the bishopric he bestowed all his wealth on the church and among the poor, resolving to live as simply as possible, and at the same time to exercise his functions as an ecclesiastical ruler with firmness and vigour. He at once ranged himself against the Arians, having demanded at his entrance on the bishopric baptism from orthodox episcopal hands. The irruption of the Goths, who were about this time ravaging the Roman Empire, compelled Ambrose to fly for safety to Illyricum. His exile was but short, as the invaders were speedily driven back by the imperial forces. On his return Ambrose was employed by the court to negotiate with Maximus, who was then threatening Italy, and whose advance he succeeded for a time in arresting (383). Four years later he was sent on a like mission, but his conduct on this occasion so offended Maximus that he had to return to Milan without having accomplished anything. In his struggles against the Arian heresy he was opposed by Justina, mother of Valentinian II., and for a time by the young emperor himself, together with the courtiers and the Gothic troops. Backed by the people of Milan, however, he felt strong enough to deny the Arians the use of a single church in the city, although Justina, in her son's name, demanded that two should be given up. He was commanded to quit the city, but this he refused to do, being still supported by the people. About this time Ambrose, instructed by a dream, searched for and found the reliques of two martyrs, Gervasius and Protasius. The people crowded to see these bones, and, according to Ambrose himself, the eyes of the blind were opened and devils were cast out by touching them. Although the court derided these miracles the people credited them, and the triumph of orthodoxy was secured. Ambrose had also to carry on a war with paganism. Symmachus, the prefect of the city, an eloquent orator, presented to the emperor a petition praying for the re-erection of the temple of Victory on its ancient place in the senate-hall, and the regular observance of various pagan ceremonies. The arguments contained in this petition were answered by Ambrose, and the pagans were defeated. In 390, after the massacre at Thessalonica, he refused the emperor Theodosius entrance into the church of Milan for a period of eight months, only restoring him after a public penance. (See Theodosius.) The later years of his life were devoted to the more immediate care of his see. He died 4th April, 397. His writings (the best edition is by the Benedictines, two vols. folio, 1686–90) bear the marks of haste, and show that his theological knowledge extended little beyond an acquaintance with the works of the Greek fathers, from whom, especially Origen, he borrowed considerably. The Ambrosian Chant, or Te Deum Laudamus, has been ascribed to him, but was written a century later. He may be considered the father of the hymnology of the Latin Church.

AMBROSIA, in the mythology of the Greeks, a sweet and balsamic juice which was brought to Zeus by pigeons. It formed the food of the gods, and preserved their immortality. It was used also as an ointment. Men who were allowed to partake of ambrosia received an increase of beauty, strength, and swiftness, and became in some measure assimilated to the gods.

AMBROSIAN CHANT. See Gregorian Ritual and Chant and Gregorian Tones.

AMBULANCE, a term of French origin, signifying a hospital establishment which accompanies an army in its movements in the field for the purpose of providing assistance, of a more or less temporary nature, to the soldiers wounded in battle. In England the word is commonly applied to the ambulance carriages, wagons, or litters, used to transfer the wounded from the spot where they fell to the hospital. Previous to the close of the eighteenth century soldiers wounded in action were either simply carried to the rear by comrades or left lying where they fell, exposed to all the vicissitudes of the battle-field, and uncared for till the close of the action. Surgical assistance did not reach them generally until the following day, and often later, when surgical or medical skill was of no avail. But in 1792 Baron Larrey, military surgeon under Napoleon I., succeeded in mitigating the horrors of the battle-field and the sufferings of the wounded by his system of flying ambulances (*ambulances volantes*), capable of being moved from spot to spot with all the rapidity of the flying artillery of that day.

In the British army ambulance system each division of an army corps has connected with it a divisional ambulance company. This consists of two bearer companies, each of which is composed of 1 surgeon-major in command, 2 surgeons, 1 quartermaster, 1 sergeant-major, 6 staff-sergeants and sergeants, 6 corporals, 48 privates, and 1 bugler, as well as the officers and men of the commissariat and transport corps attached for transport duties. As every army corps numbers 3 divisions, each of which, as we have said, has 2 bearer companies, and as the army corps has besides a cavalry brigade, which has 1 bearer company (a half divisional ambulance company) attached to it, and a body, called the corps troops, of reserve artillery and engineers, which has also 1 bearer company, each army corps has thus 8

bearer companies (or 4 divisional ambulance companies). The men of a bearer company belong to the medical staff corps, and have no relation to the regiments, battalions, or brigades composing a division. They are an integral part of the medical department of the army, which is a completely separate organization. The bearer company is subject to its surgeon-major in command, and the 2 bearer companies of a division, forming the divisional ambulance company, are under the command of the principal medical officer of the division, while the 4 divisional ambulance companies of the army corps are medically administered by a surgeon-general on the staff of the general in command of the army corps. Each bearer company has a surgery wagon, fitted with baskets containing instruments and medical and surgical appliances, cooking utensils, and medical comforts for the wounded, and carries an operating table, and surgical dressing tent, for fitting up at the dressing station; it has also water-carts and 10 ambulance transport wagons, as well as pack transport, including cacolets and litters, field-panniers borne by mules, &c. Further, each bearer company is disposed into 2 sections, each composed of 4 stretcher detachments, each stretcher detachment having a stretcher and 4 bearers, 2 to carry the stretcher and 2 for relief, the latter two carrying surgical haversack and water-bottles. Thus in every bearer company there are 8 stretcher detachments with 8 stretchers and 32 bearers (under non-commissioned officers), the remaining members of the company being intended for duty at collecting and dressing stations.

When a division is on the eve of going into action the 2 bearer companies of its divisional ambulance company form a dressing station directly in the rear of the fighting line, but if possible out of fire. Here the operating tent is pitched and arrangements made for examining and classifying wounded and doing necessary operations and dressing, and administering food, &c., the medical officer in command and a surgeon being in attendance. From the dressing station the ambulance transport wagons are sent forward to a position as near the fighting line as possible, where a collecting station is formed. Here the wagons are drawn up, and from this station the stretcher detachments are sent forward, under one of the medical officers, on to the battle-field itself. A stretcher detachment is ready to do any absolutely necessary dressing, to stop bleeding, &c., to give water or stimulant, and as quickly as may be places the wounded soldier on a stretcher, or otherwise assists him to the collecting station. At the collecting station the stretcher detachments wait only long enough to transfer the wounded to the ambulance wagon, and return to the battle-field, never going in rear of the collecting station. The wagons then transport the wounded to the dressing station and again return to the collecting station. Such are the arrangements for giving immediate succour to the wounded.

Besides these arrangements there are others. Further in rear of the division, out of reach of the action, are the field hospitals of the division, to which the wounded are taken from the dressing stations; of these there are 14 to each army corps, each fitted to receive 100 wounded. Here the slightly wounded may remain till they are able to go to the front and rejoin their regiment. These field hospitals move with the army, 2 or so miles in its rear; but still behind them, and planted on the line of communications between the army and its base are stationary hospitals, each capable of treating 200 wounded; while at the base itself there are general hospitals, capable of accommodating 500 each. Finally, between the base hospital and the permanent military hospitals at home are the hospital ships. All these arrangements, it will be noted, are under the control of the medical department of the army, the head of which is the director-general of the medical staff; and, as already said, the members of the medical staff corps have no connection with the regiments or brigades. But each regiment, or battery, or brigade has a medical officer, belonging to the medical staff corps, who goes with the regiment, and has a certain amount of drugs and dressing materials with him, sufficient to meet ordinary cases not requiring prolonged treatment. He has, to assist him, trained bearers with stretchers and surgical haversacks, *obtained from the regiment* to the number of 2 soldiers per company. These bearers form the regimental ambulance detachment, have nothing to do with the organization of the medical staff corps, and follow the regiment wherever it goes. In action they move about the battle-field, always in touch with their own corps or regiment, giving succour and carrying wounded to the rear, where they hand them over to the men of the medical staff corps.

Among the volunteers there was almost no ambulance organization until the force had been long in existence. Each regiment had one or more medical officers, but there was no bearer company, not even a stretcher detachment. Latterly this was remedied to the extent that most regiments had an ambulance company of one or more stretcher detachments with trained bearers. Behind the regiments the deficiency was still greater. In more recent times a volunteer medical staff corps was raised in England and Scotland, but the regular organization of a bearer company under a principal medical officer for each regimental district was not realized.

In civil life accidents are frequent, on the street, on the railway, in the workshop, in the mine, at the dock, and much suffering and even loss of life are occasioned by the ignorance of those about the injured man, their inability to recognize what aid may be temporarily useful, and their awkwardness even in transporting him to some place where help may be obtained. In 1878 the St. John's Ambulance Association was founded in England to meet these conditions. Its objects were by means of classes open, at little or no fee, to the public, to teach the people how to render intelligently first aid to injured persons pending the arrival of skilled medical assistance, and to place stretchers, ambulance wagons, and other appliances in suitable places for the ready and safe transport of injured persons to hospital. In 1882 the St. Andrew's Ambulance Association was founded in Scotland with similar objects. The centre of the former association is in London, of the latter in Glasgow; but they have branches all over the kingdom, and everywhere local committees can be got up and arrangements made for lectures on 'First Aid.' As a result of the work of these organizations very many persons of both sexes have received a training in 'First Aid,' so that were a person seriously injured in a busy thoroughfare, it is almost certain some one would be found in the neighbourhood who knew at any rate how to prevent further injury being done by kindly but uninstructed Samaritans. Many of the police of the larger towns have passed through ambulance classes, and in large public works, collieries, and so on, workmen have been trained to form an ambulance corps; while similar bodies exist in connection with the leading railways, composed of railway servants. In many industrial centres wagons are now placed, so that seriously injured persons can be safely carried to hospital. In America—in New York, Boston, and Chicago—civil ambulance arrangements are very complete. In New York the municipal district hospitals have regular wagons and a staff of surgeons and attendants always ready. The

hospitals are in telephonic communication with the police stations and the leading thoroughfares, and within a few minutes of an accident a completely-equipped wagon with a trained attendant can be on the spot.

The St. John's Ambulance Association, it may be mentioned, receives its name from the Order of St. John of Jerusalem, one of the knightly orders of crusader days, founded to relieve the sufferings of the pilgrims to the Holy Land and crusaders. There are also a number of societies known as Red Cross societies, which sprang from the conference at Geneva on 9th Feb. 1863, called to consider the subject of the treatment of wounded in war. These exist in every European country. They are civil societies, which send help to the field of war wherever it be, and whose flag with the red cross is recognized as protecting from molestation by either army.

AMEN, a Hebrew word, originally signifying 'verily,' 'truly,' has been transferred from the religious language of the Jews to that of the Christians, He who pronounced the blessing at the close of the service in the Jewish synagogues was answered by the Jewish audience with the word amen. Also, in the religious assemblies of the first Christians, the prayer made by the eldest of the worshippers, or by a teacher, was concluded by the people with an amen. Public prayers are still generally concluded with this word.

AMENDMENT, in law, the correction of any error committed in a process. An error in judgment cannot be amended, but an error after judgment may be. A writ of error must be brought by the party aggrieved by an error in judgment. In Parliament amendment denotes an alteration made in the original draught of a bill whilst it is passing through the houses. Amendments may be made so as totally to alter the nature of the proposition. A member who has spoken to the main question may speak again to the amendment.

AMENTACEÆ, in the natural systems of Jussieu, De Candolle, Endlicher, and others, an order of plants having their flowers arranged in amenta or catkins. As very different kinds of structure were, however, combined by this character the order has been broken up into others, the chief of which are Betulaceæ (the birch tribe), Salicineæ (the willow tribe), Balsamifluæ (the liquidambar tribe), Plataneæ (the plane tribe), and Cupuliferæ (the nut tribe).

AMERICA, or the New World, the largest of the great divisions of the globe except Asia, is washed on the west by the Pacific, on the east by the Atlantic, on the north by the Arctic, and on the south by the Antarctic Ocean. On the north-west it approaches at Behring's Straits within 48 miles of Asia, and on the north-east Greenland approaches within 370 miles of the European island Iceland; but in the south the distance between the American mainland and the eastern continent is much greater, the shortest distance between its east coast and the west coast of Africa being 1600 miles, and between its west coast and the east coasts of Asia and Australia from six to eight times more. The extreme points of America are—north, the most northerly point of Boothia Felix, in the Strait of Bellot, lat. 71° 56′ N., lon. 94° 34′ W.; south, Cape Froward, lat. 53° 53′ 45″ S., lon. 71° 18′ 30″ W., or, if the archipelago of Tierra del Fuego is included, Cape Horn, lat. 55° 59′ S., lon. 67° 16′ W.; west, Cape Prince of Wales, lat. 65° 33′ N., lon. 167° 59′ W.; and east, the Point de Guia, lat. 7° 26′ S., lon. 34° 47′ W. The entire American continent has a length of about 9500 miles; a maximum breadth, between Cape Prince of Wales and Cape Charles in North America, of 3500 miles; a coast-line of 43,200 miles; and a total area, including the islands, estimated at about 15,896,000 English square miles.

Coast-line.—The east coast of America strikingly resembles the opposite coasts on the other side of the Atlantic, the rounded shore of Africa being repeated in that of South America; while the ragged and indented outline of Europe is not unfitly represented by the shores of Melville Sound, Labrador, Nova Scotia, Maryland, Florida, and Yucatan. This difference between the east coasts of North and South America is exhibited also in their western coasts, and still more remarkably in their respective archipelagos. A similar contrast is presented by the inlets of the two continents—the Gulfs of Darien and Venezuela, the Bahia de Todos os Santos (All-Saints' Bay), and the Gulfs of San Matias and St. George on the east, and the Gulfs of Guayaquil and Panama on the west, though the largest which South America possesses, being very feeble representatives of the North American inlets, for example, Hudson's Bay, the Gulf of St. Lawrence, the Bay of Fundy, the Bays of Campeachy and Honduras, the Gulf of California, &c.

Surface.—Three-fourths of the area of America is flat, and yet, throughout, the relative position of highland and lowland is very uniform. The Andes and the Rocky Mountains stretch from north to south, and the depression of the Isthmus of Panama, which rises only from 500 to 600 feet, forms a natural separation between the cordillera systems. The cordilleras of South America descend by steep short terraces to the sea-shore, or to a narrow belt of level land immediately adjoining it, form regular chains, display the loftiest masses of all America, and send out only short branches to the eastern plains; whereas, on the contrary, the North American cordilleras lean, in the west, on elevated plateaus, so as to favour a large development of rivers, are less vertical in their structure, and less high, and send to the east more extensive ramifications. The names of particular groups of the Andes are taken from the countries to which they more especially appertain; thus, proceeding from south to north, we have the cordilleras of Chili, Bolivia, Peru, Ecuador, and Colombia, and along with these there occur elevated plateaus of considerable extent; while snow-capped summits, such as Aconcagua (the culminating point of America), the Peak of Sorata, Illimani, Chimborazo, Cotopaxi, the Peak of Tolima, &c., tower far above the general average height. North from the depression of the Isthmus of Panama, the North American cordilleras rise, under the names of the Cordilleras of Guatemala, Mexico, Sonora; the western, central, and eastern cordilleras, inclosing the plateaus of Anahuac, New Mexico, and Oregon, and surmounted by snow-covered summits, for example, Popocatepetl, Orizaba, Shasta, Mount Rainier, &c. The isolated mountain groups, which do not stand in immediate connection with the cordillera system, and, with some exceptions, lie in chains parallel to the nearest coasts, are, in North America, the system of the Appalachians or Alleghanies, and, in South America, the mountain land of Brazil, Guiana, Venezuela, and the Sierra Nevada of Santa Marta. As the cordilleras fill the west with mountains, so the great American plain commences with few interruptions at their eastern base, and stretches from the shores of the Arctic Ocean to the south extremity of Patagonia. In South America the plains form three-fourths, in North America about the half of the area of their respective continents; and a general similarity in their horizontal grouping cannot fail to be perceived. The narrow plains of the Mexican coast correspond to the Patagonian steppes, and the savannahs of the Mississippi to the Pampas of the Parana, Paraguay,

and Rio de la Plata; in the same manner the Appalachians and the mountain-chains of Brazil must be regarded as forming similar interruptions to the continuity of the plains. There is also another grand point of resemblance, namely, that in both continents the great plains are situated in the east. This resemblance, however, is merely in position, and cannot be extended to the nature of the plains, since those of the northern regions and of the Amazon, when compared, are seen at once to present, not resemblances, but striking contrasts. The immense grassy flats of America have no counterpart in any other quarter of the globe whatever, and present life itself under a new and characteristic form.

Hydrography.—Of the many advantages the New World has over the Old, none is so striking as the extent of its river systems. The rivers which flow into the Pacific, however, owing to the fact that the great backbone of the continent, the Rocky Mountains and the Andes, lies so near the west coast, have so short a distance to traverse before they reach the ocean, that their volume necessarily remains small. On the other hand, those rising from the opposite slopes have extraordinarily long courses, and ramify into every part of the continent. Sometimes rivers traversing the same plains, and nearly on the same levels, open communications with each other, especially when their waters are high, and form a kind of net-work. In this way it frequently becomes difficult to fix the exact limits of the basin of any river, and to say where the watershed separating it from other basins properly begins. Of this peculiarity there is a remarkable instance in the Cassiquiari, which, branching off from the Rio Negro and joining the Orinoco, forms a kind of natural canal, uniting the basins of the Orinoco and the Amazon. The largest rivers of the world are in South America. The Amazon or Marañon has a course of about 4000 miles, and a basin of 2,300,000 square miles; and the La Plata, estimating it from the source of the Parana, is 2760 miles long, with a basin of 1,295,400 square miles. The Mississippi-Missouri, the largest river of North America, runs as long a course as the Amazon, but the area of its basin is only 1,221,000 square miles. On the other hand North America, though it does not possess the largest individual lake, has the most extensive group of lakes in the world. The river system of the St. Lawrence, with its majestic lakes, drains an area of 600,000 square miles, and, like the Mississippi, opens up the heart of the continent, whilst other rivers in countless number intersect the northern plains. In the north as in the south, in the pampas as in the savannahs, in the llanos and selvas as on the arctic flats, the copious watercourses perform an equally important part as a means of communication over widely extended areas: without them whole regions, both within the icy polar circle and within the tropics, would be uninhabitable. To this presence of water it is owing that America has no sterile deserts so extensive as those of Africa, even when, from the nature of the soil, such a result might have been anticipated. The rivers, where the strata at their mouths is of solid texture, discharge themselves into bays or estuaries, but where the ground is alluvial and soft, form deltas and lagoons. The principal rivers of America are the Mackenzie, Coppermine, and Great Fish rivers, entering the Northern Ocean; the Churchill, Nelson, Severn, and Albany, entering Hudson's Bay; the St. Lawrence, Mississippi, Rio del Norte, Magdalena, Orinoco, Amazon, Paranahiba, San Francisco, Rio de la Plata, Colorado, and Rio Negro entering the Atlantic; and the Yukon, Fraser, Colombia, San Joaquin, Sacramento, and Colorado, entering the Pacific.

Climate and Vegetation.—The climate of America, even in the equatorial regions, is characterized as comparatively cool and humid. This is justly ascribed to the vast extent of territory that may be classed as insular—to the copious waters of the interior, together with the magnificent vegetation produced by them—to the configuration of the surface and the nature of the soil—to the possession of a polar shore—and to the prevailing winds. The rainy zone is disproportionately extended in America; and as the continent stretches over all the zones, the vegetation is remarkably diversified, from the lowly moss of the north to the lordly banana of the tropics. The giant coast-chain of the Andes everywhere rises above the snow-line. From the sterile Peruvian coast, burned up by tropical heats, one can look up to summits covered with perpetual snow and ice; and one may climb from the gigantic equatorial vegetation of Quito to heights where only the condor testifies to the existence of organic life, and wings his flight over snow-fields and glaciers. In Peru the culture of cereals is carried on at the height of 12,000, and near Quito at 9000 feet. The north and south of America have the same length of day; but in the seasons, which depend not merely on astronomical but on a variety of local causes, the analogy does not hold, and very remarkable discrepancies appear. Thus, for example, the east coast of Brazil has the rainy season from March to September, while Peru, lying under the very same latitude, has it from November to March. Within the tropics the transition from the rainy to the dry season takes place almost instantaneously; but in receding from the tropics on either side the change of seasons becomes more and more gradual, until at last, in the polar zones, nature, bound in icy chains, affords for living existence only a short awakening out of a long winter sleep.

In passing from north to south through the different climates of America, the following characteristic appearances are observed. From the northern shores, almost destitute of vegetation, to an isothermal line which is in lat. 50° on the east and lat. 60° on the west coast, and shows a mean temperature of 62° Fahr. in the warmest and 14° Fahr. in the coldest month, are seen in succession plains covered first with low mosses and lichens, and then with shrubby plants, most of them yielding berries, next pines, firs, and birches, at first isolated and of stunted growth, but afterwards grouped in small woods as forerunners of tree vegetation. This becomes developed in its more vigorous forms in the next zone, which reaches to about lat. 40°, and has in the warmest month a mean temperature of 77° Fahr. and in the coldest of 35° Fahr. Here grow the trees which periodically shed their leaves and form extensive forests, for example, oaks, beeches, maples, limes, elms, chestnuts, &c.; here, too, instead of the heaths of the Old World, boundless plains become covered with various grasses, particularly to the west of the Mississippi, while to the east of it the European cereals and other plants yielding food take their place in the cultivated districts, European fruit-trees thrive, and in the more southerly portions of the zone the vine begins to attract attention. The next zone, which may be considered as forming the transition to one of a genuine tropical character, extends to lat. 25°, where the mean temperature of the hottest month is 80° Fahr., and of the coldest 66° Fahr., a difference which, amounting to 14°, induces a luxuriant vegetation. Trees with evergreen foliage, as oranges, laurels, and olives, are now seen, and vegetation presents new forms in the magnolias, tulip-trees, plane-trees, and dwarf-palms. Along with wheat, maize, and rice, sugar, cotton, and tobacco are cultivated, while the batatas and manihots offer their farinaceous roots for food. From 25° N. lat. to the

southern tropic the bananas and tropical productions occupy a zone which, under the equator, possesses a mean temperature of 86° Fahr. in the warmest, and 75° Fahr. in the coldest month, and in which the vegetable world revels in the most luxuriant and gigantic forms. Sugar-cane, cotton, and coffee now ascend to the lower mountain regions, and in their place, at sea-level, appear yams, pine apples, bananas, melon, bread-fruit and cow trees, cocoa-palms, &c. The impenetrable forests contain numerous and occasionally most majestic trees, yielding timber of the finest quality, as mahogany, guaiacum, campeachy, and Brazil woods, &c. Especially in South America tropical luxuriance is represented by the loveliest species of palms. Dense forests of the chinchona overshadow the mountain terraces of Quito; the cactus develops its most singular forms on the Mexican plateaus, and, instead of the aloe of Africa, furnishes vegetable food for the animals which might otherwise starve on the arid steppes. The ferns assume the form of trees; the grasses become almost incredibly tall; and instead of a matting of turf, numbers of creeping and climbing plants form an impenetrable web, at once attesting the wild luxuriance of nature, and furnishing, particularly in vanilla and ginger, products of great economical value. The zone reaching southwards as far as lat. 40° S. has a mean temperature of 71° Fahr. in the warmest and 53° Fahr. in the coldest month. There the palm still thrives on the lower basin of the La Plata, beside the mulberry and indigo, while thistles like trees cover the plains; the pampas and the western coasts of Chili are characterized by beautiful araucarias, by beeches and oaks, the potato and the arum. There, too, we are reminded of Europe by the plants introduced to cultivation: the vine, olive, and orange; hemp, flax, and tobacco; maize, barley, and wheat. The southern limit of the periodical rains reaches as far as lat. 48° S., when the mean temperature of 59° Fahr. in the warmest and 39° Fahr. in the coldest month still favours the growth of European cereals, and on sheltered spots of the west coast the growth even of the vine and the finer fruits. The zone reaching to the south extremity of America shows comparatively little difference between the warmest and the coldest month, the mean temperature of the one being 41° Fahr. and of the other 25° Fahr.; but the low degree of summer warmth produces a sudden change in the form of vegetation, which now presents only a few trees, as the beech and birch, and an extraordinary abundance of mosses and ferns. As in passing from the equator to the pole the region of the vegetable world gradually declines, so in climbing from the tropical shores to the ice-covered mountain summits three different climates have been distinguished by the names of *Tierra caliente*, *templada*, and *fria*. Of these the *templada* extends over those healthy and beautiful regions where a kind of perpetual spring prevails, and green pastures and noble forest-trees are found united with the fantastical and gigantic forms of the tropics.

Zoology.—If America, in respect of the development of vegetable life, takes precedence of all other quarters of the globe, it cannot advance the same claim in respect of the animal world, though it must be admitted that here too it has its own peculiar features. The American jaguar and cougar, or puma, have not the majesty of the Asiatic tiger or the African lion; the tapir is only a very humble representative of the elephant or hippopotamus, and the llama falls far short of the camel. Still, America has many animals which belong only to itself. It has its own species of bears (the grizzly being most formidable), wolf, and deer, the bison and musk ox, with special kinds of squirrels, &c. To it also belong the Virginian stag, the wild sheep of California, the opossum, and racoon. Characteristic of Central and South America are sloths, ant-eaters, and armadillos, the condor among the heights of the Andes, the most beautiful parrots as well as peculiar monkeys in the woods, the humming-bird with its rich metallic plumage, the rattlesnake, the alligator or cayman on the banks of the streams, the electrical eel in the tropical waters, swarms of mosquitoes on the wide plains, and sea fowl in such numbers on the western coast as to have furnished large deposits of guano, to which some of the richest countries of Europe are indebted for the means of extending and largely increasing the produce of their agriculture.

Mineralogy.—To no part of the world has nature been more lavish in dispensing mineral treasures. No other regions are so rich in silver, and few are so rich in gold, as some of the western portions of the United States, while the States are also equally favoured in possessing ample stores of coal, iron, copper, lead, &c. The precious metals also abound in Mexico and other American countries.

Population.—The origin of the indigenous population of America cannot now be traced. There can be no doubt, however, that man was in existence at a very early period in the western hemisphere. Human remains have been found in the coral reef of Florida, which is estimated to be 10,000 years old; and a skeleton dug up from beneath four buried forests in the Mississippi delta, near New Orleans, is supposed to have lain there for 50,000 years; but such estimates are hazardous. (See next article.) Human skeletons and fossilized bones, together with articles made by man, have also been found in Missouri, Kansas, California, in the volcanic deposits on the coast of Ecuador, and elsewhere, all under conditions indicative of remote antiquity. When the Europeans first became well acquainted with the New World they found a population presenting man under many aspects and society in various stages, from the semi-civilization of Mexico and Peru to the brutal abasement of savage life; at the extreme north of the continent they came into contact with the dwarfed Esquimaux; at the extreme south with the gigantic Patagonians; the variety of complexion embraced almost every hue met with elsewhere on the face of the globe, except the coal-black negro. (See INDIANS, AMERICAN.) Ever since the discovery of America at the close of the fifteenth century Europeans of all nations have crowded into it; and the comparatively feeble native races, partly in consequence of the barbarous treatment to which they have been submitted, and partly as the necessary result of a higher when brought into contact with a lower civilization, have rapidly diminished, or lost their distinctive features by intermixtures with whites, and also with negroes brought from Africa to work as slaves. These mixed races the Spaniards distinguish by a variety of names, as Mestizos, Mulattoes, Zambos, &c., while the native descendants of European parents are called Creoles. The total population of the New World may be estimated for the year 1910 at about 150,000,000 souls, of which perhaps 100,000,000 are whites, 25,000,000 mixed races, 15,000,000 negroes, and 10,000,000 Indians.

Civilization.—The indigenous civilization spread simultaneously from three central points—the lofty plains of Peru, Cundinamarca, and Mexico. The Peruvians under their princes and high-priests, the Incas or sons of the sun, were trained by the forms of the mild religion of Manco Capac into a peaceable but effeminate people. The Toltecs and Aztecs of the high land of Anahuac were ruled in a more

politic and warlike spirit by the Caciques; while in the centre, betwixt Peru and Mexico, the Muiscas in Cundinamarca had a spiritual and a temporal head. All of them, from Lake Titicaca to Mexico, practised agriculture, mechanical trades and arts, and have left behind them remains of a peculiar civilization. On the Isthmus of Panama savage and warlike tribes placed themselves between the theatres of civilization; while in the higher and more temperate regions of the Andes the more cultivated races gradually gained the ascendency over the ruder hordes of the low-lying plains. Southwards, in the alpine valleys of Chili, dwelt, and still dwell, the warlike and hospitable Araucanians, engaged in agriculture and the rearing of cattle; northwards, on the high plateaus of Mexico, and extensive areas now included in the United States, were, and even now are, settled tribes, who live indeed mostly by hunting and fishing, but also engage in tillage, and show traces of having once been still more civilized. The cold, taciturn, and apathetic races of uncivilized Indians inhabit the low-lying plains and the lower highlands. These roam about as hunters and fishers, but are constantly becoming more and more restricted in their limits as civilization advances, though over great areas of South America in particular they have even yet come but little in contact with civilization. Since the beginning of the sixteenth century the ethnographic condition of America has essentially changed. While the Europeans were advancing as conquerors and colonists, the native races declined or sunk. At a later period negroes were introduced as slaves. The Spaniards and Portuguese made themselves masters of South America and Mexico; the French and British of North America, though the French were soon obliged to quit the field. The Antilles in time were occupied by six European nations and a race of negroes, and Guiana became a colonial land for France, Great Britain, and Holland. The Spanish peninsula and Britain have been the main instruments to make of America a new Europe, to introduce and spread in it civilization and Christianity. The Spaniards took possession of the already civilized regions of the continent; but not being able to drive out or exterminate the inhabitants whom they found there, they established themselves among them, and made the natives their labourers and subjects. The Portuguese in the south, and the British in the north, colonized the east coast. Central America and the west of South Africa was occupied by the Spaniards. The eastern coast regions, between lat. 35° N. and 35° S., became Europeanized countries with slaves, negroes being introduced from Africa, and on either side of these parallels European lands without slaves. The Europeanized portion of America thus presents three main races—Europeans, aboriginal natives, and blacks, with intermixtures of all kinds. Their colour distinguishes them, but the other lines of separation are not all equally definite. The Spanish and Portuguese easily amalgamated with the natives; the Anglo-American, on the contrary, keeps more aloof from them; and in the West Indies, though white and black unite, they by no means incorporate. The influence of the white in settling the condition of society is decisive, since his superiority of intellect gives him an acknowledged ascendency over the listless aboriginal native, the simple and thoughtless negro, and the enterprising and active mulatto, and gradually assimilates them to his model of civilization.

Political Divisions.—The independent states of both North and South America are now all republics, Brazil having become a republic instead of an empire in 1889, and Cuba, formerly a Spanish colony, a republic in 1901. The different independent states are as follows:—In NORTH AMERICA—1. The United States; 2. Mexico; 3. Nicaragua; 4. Honduras; 5. Guatemala; 6. Costa Rica; 7. (San) Salvador. In the WEST INDIES—8. Hayti; 9. San Domingo; 10. Cuba. In SOUTH AMERICA—11. Panama; 12. Venezuela; 13. Colombia; 14. Peru; 15. Ecuador; 16. Bolivia; 17. Argentine Republic; 18. Uruguay; 19. Paraguay; 20. Chili; 21. Brazil. In NORTH AMERICA the European colonies are: the Dominion of Canada, including the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, Manitoba, Saskatchewan, Alberta, British Columbia, Prince Edward Island, the Yukon, &c.; Newfoundland; and the Bermudas, all belonging to Britain; Greenland, belonging to Denmark; and St. Pierre and Miquelon to France. The WEST INDIAN ISLANDS comprise the republics of Hayti, San Domingo, and Cuba; Porto Rico, formerly Spanish, now belonging to the United States; the British possessions of Jamaica, Trinidad, Barbados, Grenada, St. Vincent, Tobago, St. Lucia, Antigua, Montserrat, St. Christopher, Anguilla, Nevis, the Virgin Islands, Dominica, the Bahamas, &c.; the French possessions of Guadeloupe and dependencies, Martinique, the north part of the island of St. Martin's; the Dutch possessions, the south side of St. Martin's, Curaçao and dependencies; and the islands of Santa Cruz, St. Thomas, and St. John, belonging to Denmark. In South America the British possess (besides the Falkland Islands) a part of Guiana, other portions being owned respectively by the French and Dutch.

Discovery.—The merit of first unlocking the American continent to modern Europe belongs to the Genoese Christopher Columbus, who, after a voyage of discovery as dangerous as it was fortunate, discovered, in October, 1492, Guanahani, one of the Bahamas, and named it San Salvador. It is certain, however, that Europeans had in the earlier part of the middle ages, and on different occasions, discovered the American coasts. Northmen proceeding from Iceland discovered the north polar land of Greenland. The Icelander Bjorne Herjulfson, in 986, got a glimpse of the coasts of Massachusetts and Rhode Island, which in the year 1000 were visited by Leif the Lucky, and named by him Vinland. In 1388 and 1390 Niccolo and Antonio Zeni undertook voyages to the North Atlantic Ocean, and were wrecked on Frieslanda, probably the Faroe Islands; thereafter they saw a part of the north-eastern coast of America, probably Nova Scotia, which they named Drogno. These discoveries, however, had no influence on the enterprise of Columbus, and cannot detract in the least from his merit; they were forgotten, and had never been made known to the inhabitants of the south of Europe. Though Columbus was the first of his time who set foot on the New World, it has taken its name not from him, but from Amerigo Vespucci. The mainland was first seen in 1497 by Sebastian Cabot, who sailed under the patronage of Henry VII. of England. See NORTH AMERICA and SOUTH AMERICA.

AMERICAN ANTIQUITIES. The antiquities of America present a study of great interest from many points of view. In particular they afford evidence of the existence in long-past ages of a numerous population spread over a widely extended region of the northern and southern continents, and with a civilization varying in degree but distinguished throughout by common characteristics. The first inquiry which naturally suggests itself is in regard to the antiquity on the New Continent of man himself, but in regard to this no satisfactory evidence has been reached. Human remains have been found along with those of extinct mammals, and in geological formations indicating an antiquity extending far beyond any authentic historical records either of the

Old or of the New World (see preceding article); but little direct evidence as to the antiquity of man in America has been obtained. That this continent received its early inhabitants from Asia is exceedingly probable, and it may have also received some from Europe by way of Greenland and Labrador. The aboriginal inhabitants appear to have been in the palæolithic or early stone age, and to this followed, in America as elsewhere, the neolithic or later stone age. The stone implements of these periods are not different in America from those found elsewhere, but subsequently American culture developed on lines of its own; and the antiquities which we are here to deal with are those that possess a special American character, such as earth-works, pyramids, and other remains of human industry which, from their local associations, afford some direct internal evidence of human history. These distinctively American antiquities might perhaps be divided into two or three sections or periods, in particular into a historical and a non-historical period, the first embracing those remains regarding which there is authentic external historical information; the second, those regarding which there is no authentic information of an external kind. These last again may be divided into two sections, those regarding which there are circumstantial and apparently historical traditions, and those regarding which there are no traditions that have any appearance of being historical. The materials for effecting such a classification have, however, been greatly impaired by the ruthless conduct of the early conquerors. These, the Spaniards in particular, actuated by a cupidity which had as little regard to science as to humanity, carried on a war of extermination not only against the natives themselves who retained their independence, but against every symbol of their former greatness, aiming at the complete degradation of the native races and their reduction to the most abject slavery, and in some cases altogether effecting their extinction. Thus two things of the highest importance to science were lost, historical monuments and living testimony.

The central region of the American continent, embracing the table-lands formed by the mountain systems of both divisions (North America and South America), in which, owing to the elevation of the surface, a moderate temperature is preserved, was the principal seat of ancient American civilization, and within this region, extending from about 35° N. to 35° S. lat., the most important remains exist. In the northern part of this region the remains to which the highest antiquity is ascribed have been found, and from this region civilization appears to have first receded; there appears, therefore, to be no authentic tradition preserved, and no probability that any information will ever be acquired, apart from that furnished by the remains themselves. The Indians of the present day, who know nothing of the history of these monuments, ascribe them to supernatural beings. In the basins of the Mississippi, Ohio, and Missouri, the remains consist chiefly of earth-works, and though the extent, regularity, and variety of these seem to place them above the reach of any Indian tribes known to have inhabited these regions since the arrival of Europeans, there are not wanting some links of connection between these monuments and the known enterprises of the later inhabitants. The leading purposes served by these works, as would appear from their nature, were those of defence, of sepulture, and of worship. There is evidence both from French and English sources that the Indians, even in historic times, were in the habit of making earth-work fortifications, and the ancient works have been partially used by them for both of the other objects. The ancient fortifications are found in positions of natural vantage, on hills, on peninsulas, and on banks of rivers. They inclose considerable areas, and are surrounded by an exterior or interior ditch; the ramparts are composed of mingled earth and stones, are often of great extent in proportion to the area inclosed, and show a clear conception of the elementary principles of fortification. They are always supplied either naturally or artificially with water, and give other indications of having been provided for a siege. Fort Hill, on the Little Miami in Ohio, has an embankment of this kind, with a line of circumvallation 4 miles in length, and varying from 10 to 20 feet in height, inclosing an area of several hundred acres. A large class of forts consist of several lines of embankment drawn across the neck of a peninsula. Barrows and tumuli containing human bones, and which bear indications of having been used both as places of sepulture and as temples, are also numerous. They are in exact geometrical forms—circles, squares, parallelograms, or combined figures. They vary much in size, the smaller apparently having been used as tombs, the larger as temples. It is seldom that more than one skeleton has been found in each mound, unless where they have been used as burying-places by the later Indians. A mound on the plain of Cahokia in Illinois, opposite the city of St. Louis, is 700 feet long, 500 broad, and 90 feet high; and on the site of this city there were so many of these mounds that it was called Mound City. Another class of earth mounds represent gigantic animal forms in bas-relief on the ground. One is a man with two heads, the body 50 feet long and 25 feet broad across the breast; another represents a serpent 1000 feet in length, with graceful curves, trebly coiled tail, and open jaws, in the act of swallowing an object of oval form, represented by an embankment 4 feet high, with transverse and conjugate diameters of 160 and 80 feet respectively. The embankment constituting the effigy of the serpent is upwards of 5 feet high and 30 feet broad at the base in the middle of the body. These animal forms are supposed to be symbolically connected with objects of worship. They have been mostly found in Wisconsin and Iowa. Besides the vast dimensions of many of these structures, and their elaborate and skilful workmanship, another circumstance very difficult to account for is their immense number. Upwards of 10,000 have been counted in the state of Ohio alone. From geological changes, and from the state of the human skeletons found in them, it has been conjectured that these remains cannot be less than 2000 years old, but it is practically certain that they are by no means all of the same antiquity. The nature of many of them indicates that wars were carried on among those who constructed them, while their extent and elaborateness attest the existence of a large population, and consequently a settled agricultural condition of society, either divided into hostile states, or with powerful nomadic foes. Among the remains too are some which, together with the arts of civilization, indicate a certain amount of commerce, such as carvings of stone, elegant designs in pottery, ornaments in metal, mica, shells, and other materials brought from various parts of the continent, from Lake Superior to Mexico. What became of the people by whom these works were executed is left entirely to conjecture, for many refuse to believe that the Indians of the present day are their descendants. However, the report of the United States Bureau of Ethnology on the mounds contains the following statement:—"The links of evidence connecting the Indians and Mound-Builders are so numerous and well-established as to justify archæologists in assuming that they were one and the same people". The investigations of the bureau

also render it probable that they were constructed by a people or by peoples not much in advance of the Indians displaced by the white conquerors.

The monuments of Mexico (which see), Central America, and Peru belong to a more advanced state of civilization, approach nearer to the historical period, and make the loss of authentic information more severely felt. Great numbers of these have, as already mentioned, been destroyed, and numerous facts illustrate how rapidly the memory of what has been lost has faded. Forty-four towns were discovered by Stephen in Central America, buried in almost impenetrable forests. All these towns are within the historic period, and of many the names and dates of the founders have been preserved. The fort-like erections called *casas grandes*, which have been assumed as monuments of indefinite antiquity, were seen in use by Coronado in 1540, and several of the towns where the most celebrated ruins are found, as Cholula, Uxmal, Chichen, Quiche, and Pachacamac, are known to have been inhabited at the time of the conquest. Yet there are here also undoubtedly the remains of successive stages of civilization, and perhaps of different races. The Mexican annals contained in picture writing supply some valuable information on the movements of the American populations, but their authenticity and accuracy are not unquestioned. In Peru aqueducts, bridges, and roads of elaborate construction have been found; but the principal remains of Mexico, Peru, and Central America consist of the temples. The descriptions given by the Spanish conquerors of the Mexican and Peruvian temples are in the highest degree magnificent. The number of these edifices also appears to have been very great. In the city of Mexico nine great temples of the first magnitude and 2000 smaller ones dedicated to as many idols are mentioned, and in the whole empire 40,000 is the number estimated by Torquemada, while Clavigero places it much higher. Peru was not less magnificent in its devotions, the Temple of the Sun at Cuzco being of peculiar splendour. The Peruvian temples were generally built on elevations, surrounded with four circular embankments of earth, rising one above the other. In Central America and Mexico the form of the temples was generally pyramidal. They are known as *teocallis*, and their general plan of structure is described under that term. Besides being raised on elevated platforms formed of artificial mounds of earth, when they consist of more than one story the higher stories are usually less in area than the lower, preserving the form of a pyramid in stages. They are usually of imposing dimensions, the platform commonly containing a series of buildings, some of greater, others of less size. They are most frequently only one story in height, the chambers arranged in two parallel rows lighted by doors instead of windows, and the inner row only lighted from the outer, yet adorned with rich sculptures and gaily painted. The temple at Uxmal contains eleven chambers in each row, the roofs are supported on bearers of hard wood, while those at Palenque and Copan are formed of arched stone. The temple of Palenque is 200 feet by 180, and 25 high. That at Uxmal is 322 feet long, and is ascended from the second to the third terrace (19 feet) by well-made steps 130 feet wide. Buildings similar in character are found in Mexico, Honduras, Chiapas, and Yucatan, and numerous hieroglyphics are found in them, from which it appears that the inhabitants of these districts had formerly the same written language. At Copan in Honduras, where the principal temple and subordinate buildings are contained within a sacred enclosure, the skull of a quadrumanous animal is carved repeatedly in high relief on the walls. Numerous well-executed statues, as well as hieroglyphics and sculpture in relief, occur in other buildings, and at Copan there are also several sculptured obelisks. At Chichen a space of 274 feet long and 30 wide is inclosed by walls 30 feet thick. It is supposed to have been designed for some public games. There is a curious peculiarity about some of these buildings, that they appear to have been originally constructed with doors, and intentionally walled up as soon as finished. There is a rectangular court at Uxmal, called the *Sala de las Tortugas*, which has been paved entirely with carved figures of tortoises in demi-relief. It is calculated that it consisted originally of 43,660 carved stones. In the United States, from Arizona north to southern Utah, and from western New Mexico to eastern California, similar remains occur.

AMERICANISM, a term, phrase, or construction of sentences peculiar to the inhabitants of the United States. Americanisms are of various kinds, namely: 1. New words, as *caucus*, *bunkum*, &c. 2. Old English words with new meanings, as *block*, the houses or land between four streets in a town; *section*, a square mile of land; *store*, as in book-store, a bookseller's shop. 3. Words formerly provincial in England, now adopted in general American use, as *wilt* for wither. 4. Words which have retained in America the meaning which they have lost for centuries back in England, as *sick*, which is the ordinary word for being ill, while in England it usually means sick at the stomach. The following is a list of the more noteworthy Americanisms.

Admire, to wonder or feel surprise.

Ambition, used as a verb instead of aspire or desire greatly.

Approbate, to approve, to express approbation of.

Around, or *round*, about or near. *To hang around* is to loiter about a place.

Back of, behind; in a position to the rear of.

Bad, very much. An American wants to see you *awful bad*; an Englishman would like very much to see you.

Balance, the remainder of anything; as, 'a great many people got into the theatre; the balance had to remain without'.

Bee, an assemblage of persons, generally neighbours, to unite their labours for the benefit of an individual or family, or to carry out a joint scheme. *Apple-bees* are occasions when the neighbours assemble to gather apples, or to cut them up for drying; *husking-bees*, for husking corn, are held in barns, and give occasion to much frolicking among the young folks; *quilting-bees* are parties of young women who assemble round the frame of a friend's bed-quilt, and accomplish more in one afternoon than a single person could do in weeks. Beaux and refreshments help to render the meeting more agreeable. *Spelling-bee*, a public or private meeting got up for a competition in spelling. Public spelling-bees have usually a formally elected chairman, examiners, and umpires; and prizes are frequently given to the successful competitor.

Blaze, to cut a piece out of the side of trees in a forest at such a distance from each other that the traveller can easily discover them, and thus follow the right path.

Bogus, false, counterfeit.

Boss, an employer or superintendent of labourers, a leader.

Break-down, a riotous dance, especially of the negro kind.

Bug: in most parts of America coleopterous insects generally are called bugs, just as in England they are called beetles.

Bully, fine, capital, as a bully horse, picture, &c. *Bully for you* means you have done very well.

Bunkum or *buncombe*, talk for talking's sake, and in an inflated style.

Calculate, to suppose, to believe, to think.

Calico, in America, printed muslin goods; in England, plain or printed cotton cloth generally.

Camp-meeting, a meeting held in the fields or wood for religious purposes, and where the assemblage encamp and remain several days.

Cane-brake, a thicket of canes.

Car. In America the carriages and waggons that compose a railway train are called the *passenger cars*, *smoking*

cars, mail cars, baggage cars, and *freight cars*. The Englishman travels by rail or takes the train to a certain place; the American takes or goes by the cars.

Carpet-bagger, a needy political adventurer who tries to get into place or power by flattering or coaxing the negroes in the Southern States to give him their votes.

Caucus, a private meeting of the leading politicians of a party to agree upon the plans to be pursued in an approaching election.

Caution, to be a; to be a warning.

Cave in, to; to break down, to fail, to acknowledge one's self beaten.

Chalk: a *long chalk* means a great distance, a good deal.

Chawed up, demolished, discomfited; *catawampously* or *catawamptiously chawed up*, thoroughly beaten.

Chunk: a short thick piece of wood or any other material.

Circumstance: not a circumstance to, means not to be at all compared to.

Clever, good natured, obliging.

Cobbler, a drink made of wine, sugar, lemon, and pounded ice, and imbibed through a straw or other tube, as sherry-cobbler.

Cocktail, a stimulating drink made of brandy or gin mixed with sugar, and a very little water.

Corn-husking, or *corn-shucking*, an occasion of which a farmer invites the people of his neighbourhood to his place to assist him in stripping the husks from his Indian-corn.

Cow-hide, a peculiar kind of whip made of twisted strips of raw hide; to cow-hide is to flog with this whip.

Creek, a small river or brook; not as in England a small arm of the sea.

Cruel, often used in the sense of exceedingly.

Curious, very fine, excellent.

Cuss, a vulgar mispronunciation of curse: a *darned cuss* is an obnoxious fellow.

Dander: to get one's *dander raised*, to have one's *dander up*, is to have been worked into a passion.

Dead-heads: people who drink at a bar, ride by rail or omnibus, travel by steamer, or enter the theatre, without paying, are called dead heads; those consist chiefly of the railway and steamboat employés, editors and reporters of newspapers, and a favoured few of the general public, whom a theatrical manager puts on his free list.

Do tell! really! is it possible?

Down east, in or into the New England States. A *down-easter* is a New Englander.

Elegant, excellent.

Eyes: to keep one's *eyes skinned*, is to be on the alert.

Fall, autumn (also English to some extent).

Fall, used as an active verb, as in to *fall* (instead of fell) a tree.

Fits: to *give one fits* is to punish one very severely.

Fix, to; to put in order, to prepare, to adjust. To fix the hair, the table, the fire, is to dress the hair, lay the table, make up the fire. I won't do it, no how you can fix it, is a common expression for I won't do it by any means.

Fixings, a word used with absurd laxity to signify arrangements, dress, embellishments, luggage, furniture, garnishings of any kind.

Free love, the right to consort with those with whom we have elective affinities (?), regardless of the shackles of matrimony.

Go, to; to go for anything is to be in favour of it; but to go for a person often means to pursue and do him serious even fatal injury; to go the whole or the big figure, the whole hog, the entire animal or quadruped, is to do things on the largest possible scale.

Gone coon, a man whose case is hopeless, who is past recovery.

Grit, courage, spirit, mettle.

Guess, to; to believe, to suppose, to think, to fancy; also used emphatically, as 'Joe, will you liquor up?' 'I guess I will?'

Gulch, a deep abrupt ravine, caused by the action of water.

Hard row to hoe, a difficult task.

Hatchet, to bury the hatchet, derived from the Indian custom, is to make peace; to dig up the hatchet, is to make war.

Help, a servant.

High-falutin, inflated speech, bombast.

Hitch: of persons who cannot agree, it is said that they *don't hitch horses*, or simply they don't hitch.

Hoe-cake, a cake of Indian meal baked before the fire.

Hominy, Indian-corn soaked, husked, and then boiled over a gentle fire.

Hoosier, a native of Indiana.

Horn: in a horn, means in a moment; it is often used as an equivalent to the English school-boy phrase 'over the left.'

Indian summer, the short season of pleasant weather usually occurring about the middle of November, equivalent to our St. Martin's summer, and the Shaksperian all 'hallown summer.' In New England the term is applied to the two or three weeks' fine weather occurring in the month of October.

Jessie: to *give one jessie* is to thrash him.

Johnny Cake, a cake made of Indian meal mixed with milk or water and sometimes a little stewed pumpkin; the term is also applied to a New Englander.

Julep, a drink composed of brandy or whisky with sugar, pounded ice, and some sprigs of mint.

Knock-down and drag-out fight, a fight carried to extremities.

Know-nothings, a party whose programme was the repeal of the naturalization laws, the exclusion from office of all but native Americans, war on Romanism, &c.

Levee, used to designate an *evening* assembly; also an embankment on a river.

Liquor up, to, or simply to liquor; to take a dram.

Loafer, a lounger, a vagabond.

Log-hut, or *log-house*, a temporary hut constructed with unhewn logs, roughly notched together at the corners, and the interstices filled up with clay.

Log-rolling, the assembly of several parties of wood-cutters for some days to help one of them in rolling their logs to the river after they are felled and trimmed; also employed in politics to signify a like system of mutual co-operation; thus one member of the legislature will promise to vote for the measure of another, who, it is understood, will vote for his friend's bill in turn.

Longshore men, men employed to load and unload vessels.

Lot, a piece or division of land; an allotment.

Lumber, timber sawed and split for use; as beams, joists, planks, staves, hoops, &c.

Lynch law, an irregular species of justice executed by the populace or a mob, without legal authority or trial.

Mail letters, to; to post letters.

Make tracks, to; to run away.

Marooning party, a pic-nic party made up to spend several days in the country, or by the sea-side.

Mitten: to *get the mitten* is to meet with a refusal.

Mizzle, to; to abscond, or run away.

Mud-head, a native of Tennessee.

Mush, a kind of hasty pudding.

Muss, a state of confusion.

Oak-openings, forests of short, thinly scattered oak-trees.

One-horse: a one-horse thing is a thing of no value or importance, a mean and trifling thing.

Picaninny, a negro child.

Pile, a quantity of money.

Planks, in a political sense, are the several principles which appertain to a party; *platform* is the collection of such principles.

Possum, to play; is to deceive one. The possum deceives its pursuers by feigning to be dead.

Raise Cain, to; to cause a disturbance.

Rile, to; to irritate, to drive into a passion.

Rooster, the common domestic cock.

Rowdy, a quarrelsome fellow, a brawler, a rough.

Run, a rivulet.

Run one's face, to; to take goods on credit.

Shanty, a temporary hut.

Shin-plaster, paper money, especially such as has depreciated in value.

Smart, often used in the sense of considerable, a good deal, as a *smart chance*, *smart potatoes; right smart of eggs*, a good many of them.

Smile, a dram.

Socdolager, a conclusive argument, a decisive blow.

Soft sawder, flattering, coaxing talk.

Some pumpkins, persons or things of dignity and importance.

Span of horses, two horses of nearly the same colour, and otherwise as nearly as possible alike, harnessed side by side.

Spread-eagle style, a compound of exaggeration, bombast,

mixed metaphor, defiant threats thrown at the world, and irreverent appeals flung at the Supreme Being.

Spry, active.

Stampede, sudden fright and flight or dispersal.

Store, a shop: a *shop* is a workshop or factory.

Straight, undiluted, unadulterated.

Stranger, the form of address to a person whose name is unknown.

Stump oration, a bombastic speech made to please the popular ear: so-called from the fact that speeches in newly-settled districts are often delivered from stumps of trees.

Sun-up, sunrise.

Tall, great, fine (used by Shakspere pretty much in the same sense); *tall talk* is extravagant talk.

Ticket: to vote the *straight ticket* is to vote for all the men or measures your party wishes.

Truck, vegetables raised for market; also, articles of various kinds, stuff.

Ugly, ill-tempered, vicious, quarrelsome.

Upper ten thousand (contracted into *the upper ten*), a phrase invented by N. P. Willis to designate the upper circles of New York; now the upper classes generally.

Vamose, to; to run off (from the Spanish *vamos*, let us go).

Vigilance committee, a number of the inhabitants of a town or district, who, assuming that the regular magistrates are unable or unwilling to execute the laws, undertake to watch over the safety of the place and punish its criminals.

You don't! a contraction of you don't say so, a gentle mode of giving the lie to a statement; as, 'I saw him jump over the house.' 'Now, you don't!'

AMERICUS VESPUCIUS, properly AMERIGO VESPUCCI, an Italian mariner, after whom America has been named, was born March 9, 1451, at Florence. He was educated under the care of his uncle, the friar Giorgio Antonio Vespucci, and embraced a mercantile life. We find him in Spain in 1486 engaged in trade; and he was at the head of a large Florentine firm in Seville in 1496, when Columbus was making preparations for his second voyage. In 1499 he took part in the expedition of Ojeda to Surinam, from which he returned next year to Spain. After this he entered the service of King Emanuel of Portugal, and made two voyages in Portuguese ships to America, the first in 1501–2; the second in 1503–4, he having the command of the latter expedition, with which he examined a part of the coast of Brazil and discovered the Bay of All-Saints. In 1505 he again entered the service of the King of Spain, but made no more voyages, as appears from memoranda showing that he was at Seville till 1508, at which time he was appointed principal pilot. His duties were to prepare charts and prescribe routes for vessels in their voyages to the New World, which soon received his name. This honour certainly belonged to Columbus rather than to Vespucci, for the prior discovery of the continent by the former is not to be questioned. Vespucci, however, had nothing to do with the accident or error by which his name was given to America, and must not be accused of having wished to appropriate to himself the honour which really belonged to Columbus, with whom he was on friendly terms. The name Americi Terra was applied to that continent in 1507 by Martin Waldseemüller (Martinus Hylacomylus), a geographer of Freiburg in Breisgau, in a work entitled Cosmographiæ Introductio. Vespucci died at Seville in 1512.

AMERSFOORT, a town in Holland, in the province of Utrecht, and 12 miles north-east of the town of Utrecht. By the Eem, on which it stands, it has a navigable communication with the Zuider Zee. It manufactures woollen goods, tobacco, glass, and silk-yarn, and carries on an extensive trade in grain. The grand pensionary of Holland, Johan van Oldenbarneveld, commonly called Barneveldt, was born here. Pop. (1900), 19,089.

AMETHYST. See QUARTZ.

AMHARA, a district of Abyssinia, lying between the Tacazzé and the Blue Nile, but of which the limits are not well defined. The Lake of Tzana or Dembea is near its centre, and the Blue Nile waters its south frontier. It is generally fertile, and both produces heavy crops of barley and rears numerous herds of cattle. Excellent grapes are grown on the mountain slopes. From 1833 to 1852 Amhara was an independent kingdom. It was conquered by Theodore II. of Abyssinia, and remained subject to him till his death in 1868; it was again ruled for a few years by an independent chief; and then was broken up among a number of petty chiefs. It now forms the central portion of Menelek's kingdom. The Amharic is an important Abyssinian dialect.

AMHERST, a seaport and district in Lower Burma, on the east side of the Gulf of Martaban and on the Salween estuary, 31 miles south of Moulmein. It has little importance except as a health resort of Europeans, who come here for bathing and sea air. Pop. 5000.—The district has an area of 15,189 square miles, and a pop. of over 300,000. It contains the important seaport of Moulmein.

AMIANTHUS, a kind of flexible asbestos. See ASBESTOS.

AMIDES AND AMINES. The hydrogen in ammonia (NH_3) may be replaced by metals, by the radicles of organic acids, or by the radicles of organic bases, generally of alcohols. To those derivatives of ammonia containing organic or metallic *acid* radicles the name of *amides* is given, and to those containing *basic* radicles the name of *amines* is given. Thus we have $NH_2.C_2H_3O$ = acetamide, that is, ammonia in which the hydrogen is partly replaced by the radicle of acetic acid; again, we have $NH_2.C_2H_5$ = ethylamine, that is, ammonia in which the hydrogen is partly replaced by the radicle of ethylic alcohol. Each class is further subdivided according as one, two, or three hydrogen atoms in ammonia are replaced.

AMIDOGEN, the name given to the group NH_2, which is supposed to occur in several compounds. This group is unknown in the free state.

AMIENS, a town of France, capital of the department of Somme, on the railway from Boulogne to Paris, in the centre of a fertile district, and traversed by the Somme, which, within the town, is subdivided into eleven canals, and affords great facilities for its numerous manufactures. It possesses a citadel, and has wide and regular streets and several large open areas. The most magnificent edifice of Amiens is its cathedral, of European fame. It was founded in 1220, and not completed till 1288. Its west front, which is said not to have been finished till a century later, is flanked by two quadrangular towers, and is decorated in the richest Gothic style. The spire, of a light and airy form, is 420 feet high. The entrance is by three magnificent porches covered with numerous bas-reliefs, on which scriptural and allegorical subjects are admirably represented. Among the other buildings of note are the churches of St. Germain and St. Remy, the Hôtel de Ville, the prefecture, the palais de justice, the Hôtel Dieu or general hospital, the Château d'Eau, the theatre, and the library, containing 50,000 volumes. Amiens having water communication with the sea by the Somme, which is navigable for vessels of 40 or 50 tons, is well situated for trade, and has numerous important manufactures. The principal industries are the manufacture of cotton velvets and woollens, and the spinning of wool, flax, and hemp. There are also dye, soap, and beet-root sugar works, bleachfields, paper-mills, and other industrial establishments. Here in 1802 was signed the Peace of Amiens.

Amiens was taken by General Manteuffel in the Franco-German war on 28th November, 1870. Pop. in 1896, 88,731; in 1906, 90,920.

AMIENS, Mise of, the award of Louis IX. of France on the question as to how far Henry III. must observe the Provisions of Oxford. The award was given on Jan. 23rd, 1264, and was in favour of Henry's position, and it contained a proviso that the ancient charters and liberties of the realm must not be touched.

AMIENS, Peace of, concluded between Great Britain, France, Spain, and the Batavian Republic, March 27, 1802. Britain retained of her conquests the islands of Ceylon and Trinidad; the harbour of the Cape of Good Hope remained open to her ships. France regained her colonies, and the Araowari was made the boundary of her possessions in Guiana on the side towards Brazil. The republic of the Seven (Ionian) Islands was acknowledged, and Malta was restored to the Knights of St. John. Spain and the Batavian Republic also regained their colonial possessions, except Ceylon and Trinidad. The French were to evacuate Rome and Naples, together with Elba. The house of Orange was to be indemnified, and the *status quo ante bellum* guaranteed to the Porte. But this peace soon became unpopular in Britain. Napoleon did not respect its provisions, and was preparing to renew hostilities on a suitable opportunity. Hence Britain declared war again on May 18, 1803.

AMILCAR. See Hamilcar.

AMIRANTE ISLANDS, a group of small islands in the Indian Ocean, lying south-west of the Seychelles. They were taken possession of by Great Britain in 1814, and form a dependency of Mauritius. They produce cocoa-nuts, and turtle and fish are abundant. About six are inhabited.

AMLWCH (pronounced *Amlook*), a seaport town in North Wales, on the north coast of the island of Anglesey, and 14 miles north-east from Holyhead. It is not well built, and possesses no important buildings. The harbour is partly cut out of the solid rock, and the town possesses a fair shipping trade. There are copper mines near the town, and smelting and other industries of various kinds are carried on. Mining is said to have been carried on here by the Romans. Pop. (1901), 5306.

AMMANATI, Bartolomeo, a sculptor and architect, born at Florence in 1511. He studied sculpture there under Bandinelli, and architecture at Venice, under Sansovino. In sculpture he followed Michael Angelo, but it is as an architect that he is best known. His chief work was the Trinity Bridge over the Arno, at Florence. He died in 1592.

AMMERGAU, a district or *gau* on the river Ammer in Upper Bavaria. The inhabitants are very industrious, and are much occupied in making figures of saints, crucifixes, toys, &c., of wood, ivory, and glass, from which a considerable trade arises, having its centre in the villages of Ober and Unter Ammergau. The former village is famous on account of the Passion Play which is performed there, at intervals usually of ten years, in the open air, on twelve successive Sundays of summer. The actors in the play are chosen from the inhabitants of the village, and the whole of Christ's sufferings and death are dramatically represented on a stage, the actors being dressed in suitable costumes. The auditorium, which is partly covered in, holds about 6000, yet it is sometimes insufficient to accommodate the great concourse of spectators who flock from all quarters to the spectacle. This custom has continued since 1634 in accordance with a vow which the inhabitants then made during a plague.

AMMIANUS MARCELLINUS, a Roman historian, of the fourth century after Christ, born at Antioch in Syria about 320. His work, in thirty one books (of which the first thirteen are lost), includes the history of the Cæsars, from Nerva to Valens. The extant portion begins with the seventeenth year of Constantius. His history was highly estimated by Gibbon for its fidelity. His religious opinions are not clearly indicated in his work; and it is probable that, like many others of his time, he remained undecided between Paganism and Christianity. His work may be considered a continuation of Tacitus and Suetonius, and is very interesting and instructive. There is an old and good edition by Gronovius (Leyden, 1693), a later one by Ernesti (1773); the best is that of Wagner and Erfurdt, with Commentary (Leipzig, 1808, three vols.). There is an English translation by C. D. Yonge.

AMMON, an Egyptian deity, whose worship spread all over Egypt and other parts of North Africa, and many parts of Greece. The Egyptian hieroglyphic monuments call him Amun, the Greeks identified him with their supreme god Zeus, while the Romans regarded him as the representative of Jupiter. His worship centred in the Egyptian Thebes, which the Greeks therefore called Diospolis or the City of Zeus. A ceremony performed here annually symbolically represented the introduction of his worship from Æthiopia. The image of the god was carried on a certain day across the Nile into the desert, and after some days was brought back as if Ammon had arrived from Æthiopia. He is represented as a ram, as a human being with a ram's head, or simply with the horns of a ram. This points to his function as the protector of cattle, &c. There was a celebrated temple in the Oasis of Siwah in the Libyan desert, where Ammon delivered oracles, not by words, but by signs made by his priests, and where he was exhibited under one of the above forms. Alexander visited this temple, and was declared by the priests a son of the deity. See Oasis, Meroe, and Siwah.

AMMON, Oasis of. See Siwah.

AMMONIA, an alkaline substance, which differs from the other alkalies by being gaseous, and is hence sometimes called the *volatile alkali*. It is contained in very small quantities in the air, in rain, river, and sea water, and is produced in the putrefaction of animal and vegetable substances. Hence it is one of the important ingredients of guano. It is generally prepared by mixing together equal weights of dry quicklime and chloride of ammonium, or *sal-ammoniac*, separately powdered, and introducing them into a retort or iron bottle, and applying heat. It is a transparent, colourless gas, of little more than half the weight of common air, with an exceedingly pungent smell, and is well known under the old name of *spirits of hartshorn*. It extinguishes flame, and is fatal to life. Its formula is NH_3, and it can be decomposed into nitrogen and hydrogen by the electric spark, etc. Ammonia is rapidly absorbed by water, which at the temperature of 50° takes up 670 times its own bulk, and forms the liquid ammonia, or *liquor ammoniæ* of commerce (NH_4HO). The process for procuring this liquid is merely to connect a retort or iron bottle, in which ammonia is being generated, with a common still and refrigerator, and apply a moderate heat. It is very accurately valued by its specific gravity; that used in medicine is about 0·950. Ammonia is also soluble in alcohol. Ammonia combines with the acids, and forms a numerous class of salts, commonly spoken of as salts of ammonium. Ammonium, however, is a purely hypothetical substance represented by the formula NH_4, and displacing one atom of hydrogen or of a monad element Thus $(NH_4)_2SO_4$ is a salt of the same type as K_2SO_4 or H_2SO_4, and is sometimes written Am_2S. With car-

bonic acid it forms carbonate of ammonium (volatile sal-ammoniac, $(NH_4)_2CO_3$), which was formerly prepared by the destructive distillation of animal substances, but is now fabricated, in part, by mixing one proportion of chloride of ammonium with two of carbonate of lime, in a state of dryness, and subliming in an earthen pot; and more largely from purified sulphate of ammonium, mixed with one quarter of its weight of chalk, finely ground, and previously calcined, introduced into cast-iron retorts, and subjected to a red heat: the carbonate of ammonium, as it is formed is conveyed by a tube into a leaden or cast-iron receiver, where it is condensed. It is used as a stimulant, usually in the form of smelling-bottles, and also by bakers to raise their bread lighter and quicker than by yeast alone. With hydrochloric acid ammonia forms chloride of ammonium (sal-ammoniac, NH_4Cl), which is found native in fibrous masses and crusts, sublimed into the cracks of lava, among other volcanic matters, about the craters of volcanoes. The chloride of ammonium of commerce is partly prepared, by a tedious process, from an impure carbonate of ammonium, obtained by the distillation of bones and other animal matters. The sulphate of ammonium ($(NH_4)_2SO_4$), obtained from the gas-liquor given off in procuring illuminating gas from coal, is also made use of in the manufacture of sal-ammoniac. This salt was first procured near the temple of Jupiter Ammon, in Libya (whence the name), from burning camel's dung, and Europe was long supplied with it from Egypt. Great quantities are annually carried from Bokhara to Russia and Siberia. Sal-ammoniac is applied to many useful purposes. Occasionally it is used in medicine. A considerable portion of it is consumed by dyers to give brightness to some of their colours. By coppersmiths and tinners it is used for cleansing the surface of the metals which they are about to cover with tin. Many tons of sal-ammoniac, for the purpose of soldering, are yearly used in Birmingham. As it produces a high degree of cold when dissolving in water it also forms a common constituent of frigorific mixtures.

Nitrate of ammonium ($(NH_4)NO_3$) is formed by saturating diluted nitric acid with carbonate of ammonium. From it is obtained nitrous oxide, or laughing-gas.

Sulphate of ammonium ($(NH_4)_2SO_4$), in the form of stalactites, is found in the fissures of the earth surrounding certain small lakes in Tuscany; also in the lavas of Ætna and Vesuvius, and, dissolved in a spring, in Dauphiné. It is now obtained in large quantities from gas-liquor as a secondary product in the distillation of coal for gas-light. A chaldron of Newcastle coal affords 200 lbs. of ammoniacal liquor, which consists chiefly of sulphate and carbonate of ammonium. As mentioned above, it is an important source of sal-ammoniac, and it is now largely employed in agriculture.

AMMONITE, a genus of fossil Cephalopoda or Cuttle-fishes, belonging to the Tetrabranchiate or Four-gilled section of the class, and distinguished by the possession of an external, many-chambered shell, the *septa* or divisions of which exhibit an intricate or foliaceous conformation, different from the plain septa of the allied Nautilidæ. (See NAUTILUS.) The family Ammonitidæ, of which this genus is the type, contains the genera *Ammonites* itself, *Ceratites*, *Baculites*, *Turrilites*, *Scaphites*, *Ancyloceras*, &c. In this family the shell may be discoid, spiral, or straight; the body chamber is elongated, and the *sipuncle*, or membranous tube, pierces the septa of the shell on their dorsal aspect. As already remarked, all the members of this genus and family are extinct. The first traces of ammonites appear in Secondary or Mesozoic rocks, and at the close of the Cretaceous or Chalk period the entire family appears to have become extinct. (See plates accompanying the articles GEOLOGY and MOLLUSCA.)

AMMONITES, a Semitic race frequently mentioned in Scripture, and very often in conjunction with the Moabites. The origin of both peoples is given in Gen. xix. 37, 38. The name children of Lot is given to each of them severally in Deut. ii. 9–11 and 18–21, and to one or other or both in Ps. lxxxiii. 9. The two tribes appear originally to have occupied contiguous territories (compare Num. xxi. and Judg. xi.) on the east of Jordan and south of the Jabbok, and to have been cut asunder by an invasion of the Amorites, who drove the Ammonites north beyond the Jabbok and the Moabites south beyond the Arnon. The Amorites were driven out in their turn by the Israelites. After their severance from the Moabites the head stream of the Jabbok, which flows from the south, became their western boundary. The other limits of their territory are unknown. Rabbah, their capital, was situated near the head of the stream already mentioned. Their country was fertile, and contains the ruins of many towns, indicating a settled and numerous population. The name of the capital was changed by Ptolemy Philadelphus to Philadelphia. The Ammonites appear to have continued in close alliance with the Moabites, and they often, in particular, co-operated against the Israelites, against whom, in spite of the specious arguments of Jephthah, they doubtless cherished the feeling of a common grievance, and whose territory, lying between them, was subject to their common attacks. Wars between the Israelites and the Ammonites were therefore frequent. On the occasion when Jephthah was appointed leader of the Israelites the Ammonites had overrun the district conquered by the Israelites from the Amorites, and crossing the Jordan attacked the tribes of Judah, Benjamin, and Ephraim. Jephthah defeated them with great slaughter, and delivered the Israelites from their yoke, after they had held the ascendency on the east of Jordan for eighteen years. Another great invasion of the Ammonites took place at the beginning of the reign of Saul, when they took a northerly direction and beseiged Jabesh Gilead. Here Saul defeated them and dispersed their entire army. Nahash, king of the Ammonites, is after this mentioned as a protector of David, in whom probably he saw nothing but an enemy of Saul. Hanun, his successor, insulted the ambassadors whom David sent to condole with him on the death of his father, whereupon David took Rabbah and all the cities of the Ammonites, putting the inhabitants to cruel deaths (2 Sam. xxii. 31). In the days of Jehoshaphat the Ammonites, together with the Moabites and Edomites, invaded Judah. On this occasion the invaders quarrelled among themselves, and destroyed each other mutually. Various other incursions, both before and after these, are mentioned in the historical and prophetical books of the Old Testament. Jotham subjected them to a tribute, paid for three successive years, of 100 talents of silver and 10,000 measures of wheat and 10,000 of barley. When Tiglath-Pileser carried the Israelites captive into Assyria the Ammonites occupied the country north of the Arnon, belonging to the tribe of Gad, which they had claimed in the time of Jephthah (Jer. xlix.). The Ammonites were conquered by Judas Maccabæus. They appear to have existed as a distinct people in the time of Justin Martyr, but have subsequently become merged in the aggregate of nameless Arab tribes.

AMMONIUM, the name given to a group of elements (NH_4) supposed to exist in the compounds

formed by the action of acids upon ammonia. Hydrochloric acid and ammonia unite together, and the sole product of this combination is a substance to which the formula NH_3HCl may be given. But inasmuch as this body is possessed of properties very analogous to those of chloride of potassium, KCl (and for other reasons), it is supposed that the four hydrogen atoms are closely combined with the nitrogen atom to form a group NH_4, and that this group plays the part of an elementary body and combines with chlorine to form the chloride $(NH_4)Cl$. Those salts which are produced by the mutual action of ammonia and acids are hence called *ammonium salts*, and are formulated as containing the group (NH_4).

AMMONIUS SACCAS, a Greek philosopher who lived about 175–250. He was originally a porter in Alexandria, and derived his epithet from the principal occupation of an Alexandrian porter—the carrying of sacks of corn. When he began to teach philosophy, from whom he learned, or what he taught, is unknown. Porphyry says he was the son of Christian parents, and was brought up in their faith, which he abandoned for the polytheistic philosophy of Greece. Eusebius and Jerome deny this apostasy, maintain that he continued a Christian to the last, and attribute to him certain Christian works, in particular a Diatesseron, or Harmony of the Gospels; but it appears most probable that they have confounded him with another Ammonius. One of the things most strongly vouched in regard to the teaching of Ammonius is that he wrote nothing, and there was a mutual agreement among his disciples to keep his doctrines secret. The only thing certain in regard to his teaching is that it was historically a transition stage between Platonism and Neo-Platonism, but whether Ammonius himself made any steps in the direction of Neo-Platonism, or whether his enunciation of Platonic doctrine merely formed the starting-point for Plotinus, remains undecided. Plotinus regarded himself as a strict disciple of Ammonius, as he did also of Plato; and the Neo-Platonists refer their doctrines to Ammonius, and various statements have been made by them regarding his teaching in accordance with this view, as that his fundamental doctrine was the reconciliation of Plato and Aristotle by a higher doctrine contained in the works of both, and that he defined the deity as a trinity consisting of essence, intelligence, and power. But none of these statements are undisputed, and among the disciples of Ammonius there were, besides Plotinus, Longinus, who remained a Platonist, Origen the Neo-Platonist, Origen the Christian, and Herennius. The agreement not to commit the doctrines of Ammonius to writing was first broken by Herennius, after which Plotinus and Origen did not consider themselves bound by it. See LONGINUS, PLOTINUS, and NEW PLATONISTS.

AMMUNITION (from the Latin *ad*, and *munitio*, anything contributing to defence), military stores generally; in modern usage confined to the articles used for charging firearms. (See BOMB, GUNPOWDER, SHOT, SHELL, &c.) The act 16 and 17 Vict. cap. cvii. (1854) provides that the importation of arms, ammunition, gunpowder, &c., may be prohibited by proclamation or order in council. By another section of the same act his majesty may also forbid, by order in council, the exportation or carrying coastwise of all military and naval stores, gunpowder, or any sort of ammunition, under penalty of forfeiture.

AMNESTY (Greek, from *a* priv., and *mnaomai*, to remember), the releasing of a number of persons who have been guilty of political offences from the consequences of those offences. An amnesty is often declared in case of the rebellion of whole districts or countries, because it is not possible to exercise on them the severity of the law, and it is often considered sufficient to punish the leaders. A general amnesty was proclaimed in England, 1660, at the restoration of Charles II., from which the king excepted no one, and the Parliament only the judges of Charles I. The last act of amnesty passed in Great Britain was act 20 George II. cap. lii., in favour of those who had taken part in the Jacobite rebellion of 1745–46.

AMŒBA. See PROTOZOA.

AMOMUM, a genus of plants of the natural order Zingiberaceæ. There are numerous species, mostly natives of the eastern tropical regions. They have perennial stems. The flowers rise in conical heads, with separate stems from the root. Some of the species yield cardamoms, others grains of paradise.

AMOO or AMU DARIA. See OXUS.

AMOOR or AMUR, THE, one of the largest rivers of Eastern Asia. It is formed on the south-east of the Yablonoi Mountains, in lat. 53° 19′ 27″ N.; lon. 121° 50′ 7″ E., by the junction of the rivers Shilka and Argun; thence it flows first in a south-eastern direction till it is joined on the south by its most important affluent the Soongari, when it turns north-east, retaining this general direction till it falls into the upper part of the Gulf of Tartary, opposite the island of Saghalien, after a course which may be safely taken at 1500 miles. It forms, for a large portion of its course, part of the boundary-line between the Russian and the Chinese dominions. Near its mouth is the free port of Nikolaevsk. The river is navigable throughout for six months in the year, but during the remaining six months the navigation is interrupted on the higher and lower parts by ice.

By a treaty with China, concluded in 1858, Russia acquired the territory on the left bank of the Upper and Middle Amoor, together with that on both banks of the Lower Amoor. The western portion of the territory thus added to the Russian Empire has been organized as a separate province, with the name of the Amoor Province (area, 172,800 square miles; estimated population in 1897, 118,570). The eastern portion was joined to the Littoral Province. The land on the banks of the Amoor is on the whole fertile. Extensive tracts are covered by woods and pastures. The trade on the river is rapidly developing.

AMOR, the god of love among the Romans, equivalent to the Greek *Erōs*. He had no place in the national religion of the Romans, who derived all their knowledge of him from the Greeks. According to the later mythology Amor is the son of Venus and Mars, the most beautiful of all the gods; a winged boy, with bow and arrows, sometimes represented blindfolded. His arrows inflict the wounds of love, and his power is formidable to gods and men. He is not always a playful child in the arms of his mother, but appears sometimes in the bloom of youth, for example, as the lover of Psyche. He is brother to Hymen, the god of marriage, whom he troubles much by his thoughtlessness. (See HYMEN and CUPID.) According to the earlier mythology (that of Hesiod and Orpheus) he is the oldest of all the gods, and existed before any created being. By his means the sterile Chaos brought forth Night, from whom issued Day and Light. This Amor is the lofty idea of the all-exciting and all-fructifying love. To him, according to some writers, Hate is opposed. In English the god of love is less frequently called Amor than *Cupid;* yet with the ancients *Cupido* denoted, properly, only the animal desire, which the Greeks expressed by the word *Pathos*.

AMORGO (ancient *Amorgos*), an island in the Grecian Archipelago, one of the Eastern Cyclades, between Naxia (Naxos) and Stampalia, about 22 miles long by 5 miles broad; area, 106 square miles. It is mountainous and rocky, but its valleys are fertile, producing grapes and olives. It has a town of the same name, with a castle; and a large harbour, called Santa Anna. Near it is a Greek convent, built on a steep rock overhanging the sea, and accessible only by ladders. Amorgo was formerly a populous island, with some considerable towns, and was the birthplace of the iambic poet Simonides. Pop. 2248.

AMORITES, one of the most powerful of the Canaanitish tribes at the time of the occupation of the country by the Israelites. The name is by some interpreted Highlanders, in contradistinction to Canaanites, which is supposed to indicate dwellers in the plain; but this distinction is denied by others. To the west of the Jordan they occupied the mountains of Judah, and extended north as far as Ephraim. On the east of the Jordan they expelled the Ammonites and Moabites from their seat between the Jabbok and the Arnon, occupied the whole of Gilead and Bashan, and formed two powerful kingdoms—a northern, under Og, who is called king of Bashan; and a southern, under Sihon, called king of the Amorites. These were first attacked and overthrown by Joshua, and the Amorites on the other side of Jordan, leaguing with the other Canaanites against the Israelites, were subsequently subdued, and such of them as escaped slaughter made tributary or driven to mingle with the Philistines and other remnants of the Canaanitish nations.

AMOS, the prophet, a herdsman who appeared in the vicinity of Jerusalem under the kings Uzziah of Judah and Jeroboam II. of Israel (B.C. 810 to 784 by the common chronology), and preached with zeal against the idolatry then prevailing in Israel. His prophetical book, contained in the Old Testament, is made up of descriptions of the moral profligacy and idolatry of this people, and of threatenings and promises similar to those which the other Jewish prophets have delivered. His peculiarities are the use of certain rural images, a rounded style, clearness in the construction of his sentences, and distinctness in his descriptions. He is amongst the best of the Hebrew writers.

AMOY, a town in China, on the south shore of an island of the same name, nearly opposite to Formosa on the one side and to the mouth of two united rivers on the other. One of these rivers is navigable to the large city of Chang-chow-foo, of which Amoy is the port. Including its suburbs Amoy is about 9 miles, but the town proper, surrounded by castellated walls, is only 1 mile in circuit. It is defended by a citadel, and has a safe and commodious harbour, with water deep enough to allow vessels to lie within 50 yards of the houses. The principal exports are tea, sugar, and sugar-candy; the imports, opium, cotton goods, rice, beans and pease, &c. The value of the foreign trade is over £3,000,000 annually. Great quantities of excellent bamboo paper are manufactured, and there are also manufactures of cotton and silk goods. The native merchants of Amoy are among the wealthiest and most enterprising in China, trading extensively with Borneo, Manilla, Macassar, Java, Singapore, &c. Estimated pop. 88,000.

AMPÈRE, André-Marie, a celebrated French mathematician and philosopher, was born at Lyons in 1775, and died at Marseilles in 1836. He was appointed, at the re-establishment of the University of Paris, inspector-general of studies, and became afterwards professor of mathematical analysis at the Polytechnic School, and of physics at the College of France. His first important publication was Considérations sur la Théorie Mathématique du Jeu, a calculation of the chances of gambling in general. He is, however, best known by his discoveries in electro-magnetism, to which he was pioneered by Oersted. His last work, published in 1834, and entitled Essai sur la Philosophie des Sciences, gives a kind of philosophical summary of the labours of his life. For *ampere* as a unit see Units.

AMPÈRE, Jean Jacques Joseph Antoine, historian, the only son of André-Marie Ampère, was born at Lyons, 12th August, 1800. He studied at Paris, and early acquired a passion for foreign literature. In 1830 he delivered at Marseilles a course of literary lectures which attracted attention even in Paris. In 1831–32 he acted with great success as depute at the Sorbonne of Fauriel and Villemain. In 1833 he obtained in the College of France the chair of the history of French literature. A portion of his lessons for a succession of years have been embodied in two important works, Histoire littéraire de la France avant la 12e siècle (1839), and Introduction à l'histoire de la littérature française au moyen âge (1841). In 1842 he was admitted to the Academy of Inscriptions and Belles-lettres, and in 1847 to the French Academy. In 1846 he was named officer of the Legion of Honour. To satisfy his curiosity on foreign literature he made repeated journeys to Scandinavia, Germany, Italy, Sicily, Greece, Asia Minor, Egypt, America, and assiduously studied the greater number of the languages and literatures of Europe, by which he greatly enlarged his views, and was enabled to enrich his works both with the fruits of his imagination and of his observations as a tourist. He died, March 27, 1864. Among his other works are Littérature, voyages et poésies (1833), Ballanche (1848), La Grèce, Rome et Dante, études littéraires d'après Nature, some books of voyages, and especially l'Histoire romaine à Rome, four vols. 8vo (1856–64), originally published in the Revue de Deux Mondes. It is an attempt to connect Roman history with a description of the scenes where it occurred and of the monuments it has left.

AMPHIARAUS, son of Oicleus (according to some, of Apollo) and Hypermnestra; endowed by the gods with prophetical powers. Foreseeing that he should perish before Thebes, he hid himself; but being betrayed by his wife Eriphyle, he joined Polynices in his expedition against this city, and was one of his most valiant warriors. The besiegers having been repulsed in one of their attacks, the earth opened under him in his flight, and swallowed him, with his horses and chariot; but Zeus made him immortal. On the spot where this event is said to have taken place, at Oropus, a feast was celebrated in honour of him, and not far from this city a temple was dedicated to him, where oracles were delivered. His death was revenged by his son, Alcmæon.

AMPHIBIA, a class of Vertebrata, represented by the Frogs, Toads, Newts, Siren, Proteus, Axolotl, and allied forms. The Amphibians form a class which is ranked with the Pisces or Fishes in the province *Ichthyopsida* (or 'fish-like' Vertebrata), from the close relationship presented, in many points of structure, between these two groups. The Amphibia were long confused with the Reptiles, but the latter are to be accounted as a perfectly distinct class, inasmuch as at no period of their life do they breathe by gills, and their organization is altogether nearer that of the Aves or Birds than that of Amphibia. The latter class is therefore defined as comprising Vertebrate animals, which in their early life breathe by gills or branchiæ, and afterwards *partly* or *entirely* by lungs. The Frog, breathing in its tadpole state by gills and afterwards throwing off these organs and breathing entirely by lungs in its adult state, is an example of

the latter phase of amphibian existence. The Proteus of the underground caves of Central Europe exemplifies forms in which the gills of early life are retained throughout life, and in which lungs are developed in addition to the gills. These forms, thus breathing by means of both sets of organs, most truly illustrate the meaning of the name *amphibia* (Greek, *amphi*, both, *bios*, life), as being equally adapted for an aquatic and a terrestrial existence. A second character of this group consists in the presence of two occipital 'condyles', or processes by means of which the skull articulates with the spine or vertebral column; Reptiles possessing one condyle only. The heart of Amphibians consists of three chambers, a ventricle and two auricles; and as the venous or impure blood from the body and the pure blood from the breathing organs become mixed in the ventricle, it follows that the blood propelled through the system of Amphibians by the ventricle is of a mixed or arterio-venous character. There is in Amphibians a marked absence of any exoskeleton or outer skeleton of scales or bony plates, such as is well developed in the majority of Reptiles. The digestive system of Amphibia opens, along with the urinary and reproductive systems, into a cloaca or common chamber; and the young (as familiarly exemplified in the frog's development) pass through a metamorphosis or series of changes before attaining the mature and adult form. These characters define the class, the members of which are arranged in four orders. The first order, that of the Ophiomorpha, is represented by the Blind-worms of tropical climates, in which limbs are wanting and the body is snake-like. The Urodela or 'Tailed' Amphibians form the second order, and include the Newts, Proteus, Siren, &c., in which the tail of embryonic life persists. The Anoura, or Tailless Amphibia, form the third order, represented by the Frogs and Toads, which possess neither tail nor gills in their adult life. The last order is that of the Labyrinthodontia, which includes the extinct forms known as Labyrinthodons (which see). A number of Amphibia are shown in plate BATRACHIANS. The term Batrachia is sometimes used as equivalent to Amphibia, but it is better to restrict this term to the tailless Amphibia, or frogs and toads.

AMPHIBOLE. See HORNBLENDE.

AMPHICTYONIC LEAGUE (or COUNCIL), in ancient Greece, an assembly composed of deputies from twelve Greek tribes, the names of which are given as Ionians, Dolopians, Thessalians, Œtœans, Magnetes, Malians, Phthiotians, Dorians, Phocians, Delphians, Locrians, Bœotians, and Perrhibæans. The tribes sent two deputies each, who assembled with great solemnity; composed the public dissensions, and the quarrels of individual cities, by force or persuasion; punished civil and criminal offences, and particularly transgressions of the law of nations, and violations of the temple of Delphi. At first the deputies met at Delphi, afterwards also at the village of Anthela, near Thermopylæ, at the former place in spring, at the latter in autumn. After the decision was published a fine was inflicted on the guilty state, which if not paid in due time was doubled. If the state did not then submit, the whole confederacy took arms to reduce it to obedience. The assembly had also the right of excluding it from the confederation. An instance of the exercise of this right gave rise to the Phocian war, which continued ten years (B.C. 355–346).

AMPHION, in Greek mythology, son of Zeus and Antiope, his twin brother being Zethus. He is represented as being the oldest of the Grecian musicians. In Lydia, where he married Niobe, the daughter of King Tantalus, he learned music, and brought it thence into Greece. He reigned in Thebes, which he partly built, and it is said that at the sound of his lyre the stones voluntarily formed themselves into walls; also that wild beasts, and even trees, rocks, and streams, followed the musician. With the aid of his brother Zethus he is said to have revenged Antiope, who had been imprisoned and ill-used by his father, and to have bound Dirce, his stepmother, to the horns of a wild bull. This incident is supposed to be represented by the famous piece of sculpture the Farnese bull in the Farnese Palace at Rome.

AMPHIOXUS. See LANCELET.

AMPHISBÆNA (from Greek *amphis*, both ways, and *bainō*, to go), a genus of serpent-like lacertilian reptiles with a cylindrical body, destitute of scales, divided into numerous annular segments, and having the head scarcely to be distinguished from the tail—hence the old notion that it could move equally well with either end foremost. There are several species found in tropical America. They feed on ants and earthworms, and were formerly, but erroneously, deemed venomous.

AMPHITHEATRE, with the Romans, a building without a roof, of a round or oval form, destined for the combats of gladiators or of wild beasts. In the middle was the arena, a large place covered with sand, on which the fights were exhibited. Round about were the vaults or caves in which the animals were kept; above these was the gallery, from which ascended successive rows of seats, each of greater height and circumference than the preceding. The first fourteen were for the senators and judges, the others for the common people. Julius Cæsar erected the first large amphitheatre at Rome for his gladiatorial exhibitions. It was of wood. Statilius Taurus, twenty years later, built the first stone one. The Coliseum at Rome is the largest of all the ancient amphitheatres. (See COLISEUM.) In Verona there is one the interior of which still shows the whole ancient architecture, and is carefully preserved.

AMPHITRITE, in Greek mythology, a daughter of Oceanus and Tethys, or of Nereus and Doris. Poseidon wished to make her his wife, and as she hid herself from him he sent a dolphin to find her, which brought her to him, and received as a reward a place among the stars. As a goddess and queen of the sea she is represented as drawn in a chariot of shells by Tritons, or riding on a dolphin, before which a cupid swims, with the trident of Poseidon in her hand.

AMPHITRYON, in Greek mythology, King of Thebes, son of Alcæus, and husband of Alcmena. Plautus, and after him Molière, have made the trick played upon him by Zeus (in assuming his form in order to enjoy the embraces of his wife) the subject of amusing comedies, in which the return of the true Amphitryon, and his meeting with the false one, occasion several humorous scenes.

AMPHORA, a vessel used by the Greeks and Romans for holding various liquids, particularly wine. They were of various forms, but most commonly tall and narrow, with a pointed end which fitted into a hole or socket to enable them to stand upright. Properly an amphora was a two-handled vessel, from Greek *amphi*, both, and *phero*, to carry.

AMPLITUDE, in astronomy, the distance of any celestial body or other object (when referred by a secondary circle to the horizon) from the east or west points; the complement to the amplitude, or the distance from the north or south point, is called the *azimuth*.

AMPULLA, in antiquity, a vessel bellying out like a jug, that contained unctions for the bath; also a vessel for drinking at table. In ecclesiastical rites the ampulla was employed for several purposes, such as holding the oil for chrismation, consecration, &c.,

also for anointing monarchs at their coronation. The ampulla used in anointing the French kings was a famous vessel, being, according to tradition, brought by a dove from heaven for the baptismal unction of the crafty Clovis I. in 496. In the revolution this ampulla was destroyed; and it is said that a soldier oiled his boots with the miraculous liquid. On the coronation of Charles X. in 1825 the public papers stated that a phial containing some of this unction had survived the catastrophe. The ampulla of the English kings now in use is an eagle, weighing about 10 oz., of the purest chased gold. Having passed through various hands to the Black Prince, it was by him deposited in the Tower. Henry IV. is the first king who was anointed from it. See ANOINTING.

AMPUTATION, in surgery, that operation by which a member is separated from the body according to the rules of the science. Though the medical art endeavours to prevent the necessity of amputation, yet many cases arise in which it is absolutely necessary, in order to save the life of the patient. There is no decisive proof that Hippocrates ever performed this operation. A. C. Celsus, who lived under Tiberius, has left a short description, in his book De Re Medica, of the mode of amputating gangrenous limbs. Paulus Ægineta, about eight centuries afterwards, suggests little improvement. The Arabians seem to have made little progress in the art of suppressing the bleeding after the amputation, which was still the most important desideratum. The greatest improvements were introduced by Paré, a French surgeon, in the sixteenth century, since whose time amputation has been performed with much skill among all civilized nations, and in the latest times with a boldness at which former ages would have shuddered, and with great precision and success.

AMRITSIR, or AMRITSAR (that is, 'the pool of immortality'), a town of Hindustan, capital of a district of the same name, in the Panjab, the principal place of the religious worship of the Sikhs. It is, on account of its favourable situation between Cabul and Delhi, Cashmere and the Deccan, a place of great trade, and has considerable manufactures of shawls and silks; but its chief attraction to the natives is the sacred pond, constructed by Ram Das (one of the earlier pontiffs of the Sikh faith), in which the Sikhs immerse themselves that they may be purified from all sin. This holy basin is 150 paces square, built of brick, having in its centre the chief temple of the Sikh religion. Under a silken canopy in this temple is deposited the book of Sikh religion and laws, called the Granth. The voluntary contributions of pilgrims and devotees support this place, to which 600 priests are attached. Pop. (1901), 162,429 (including cantonments).—The district of Amritsir lies between the rivers Ravi and Bias. It is intersected by numerous canals. Its area is 1601 miles.

AMRU, IBN-AL-ASS, originally an opponent, and subsequently a zealous supporter of Mohammed, and one of the ablest of the Mohammedan warriors. At the head of a comparatively small force he invaded Egypt in 638, and brought it under the yoke of the caliph Omar. He governed Egypt with little interruption till his death in 663, and is said to have acted with such wisdom as to have gained the affections of the Egyptians. The story of the destruction of the library of Alexandria by order of the caliph Omar, of which Amru is said to have been the instrument, does not rest on good authority.

AMSTERDAM, otherwise AMSTELDAM (that is, the dam or dyke of the Amstel; Latin, *Amstelodamum*), one of the chief commercial cities of Europe, capital of the kingdom of the Netherlands and of the province of North Holland, situated at the confluence of the Amstel with the Y or Ij (pron. *eye*), an arm of the Zuider Zee. It is of a semicircular form, with the diameter resting on the Y. On account of the lowness of the site of the city the greater part of it is built on piles. In earlier times Amsterdam was a strong fortress, but the ramparts have been demolished and the bastions converted into promenades or covered with buildings. On the land side it is defended by a number of detached forts, and by a system of sluices the country round can be laid under water if desired. Within the semicircle which the borders of the city describe on the land side, concentric with a broad moat, or canal encircling it all round, several canals form many smaller semicircles, which all open into the Amstel river or into the Y. The city is cut up into ninety islands by the canals, which are crossed by nearly 300 bridges, the bridges having generally a drawbridge in the middle for the passage of vessels. The vessels to be seen loading and unloading in all parts of the city, and passing to and fro along the canals, the lifting and lowering of drawbridges, and the general stir of business, give the streets of Amsterdam a very lively appearance. Some are traversed by electric tramways. The principal streets, the Heeren, Keizer, and Prinzensgraacht, may vie with those of any capital in Europe. They run in semicircles, and like most of the streets of Amsterdam have a canal in the middle with broad brick-paved quays on either side, planted with rows of trees. The houses are generally of brick, many of them six or seven stories high, with pointed gables turned to the streets. They are frequently swayed out of the perpendicular, and narrower below than above. Among the public buildings the old stadthouse, now a royal palace, is particularly famous. The erection of it was begun under the superintendence of the architect Jakob van Kampen in 1648, and it was finished in 1655. This splendid building, which is said to stand upon 13,659 piles driven seventy feet into the ground, is 282 feet long, 235 feet wide, and 116 feet high, without reckoning the high tower. The interior, no less grand than the exterior, was decorated by the Dutch painters and sculptors of the seventeenth century with their master-pieces. The great hall is one of the finest in Europe. It is 111 feet long, 52 wide, 90 high, and is lined with white marble. The justiciary hall, next the palace, a modern structure in imitation of a Grecian temple, is regarded as the finest edifice in the city. The present town-hall, formerly the Admiralty, is large and commodious, and dates from the fourteenth century. A fine new exchange has been built (1901) and the old plain building demolished, leaving an open space. The Palace of National Industry (Paleis voor Volksvlijt) is an iron and glass building, 440 feet long by 280 broad, with a dome, 200 feet high erected between 1855 and 1864, and devoted to industrial and artistic exhibitions, &c. Other buildings include the beautiful Trippenhouse, where the Academy of Science assembles; the national museum (built in 1877–85); the central railway-station (opened in 1889); the post-office; the building formerly occupied by the East India Company, &c. There are many churches; the French, the English, and even the Greeks and Armenians being provided with places of worship. The most splendid is the New Church (Nieuwe Kerk) upon the Damm, a fine building in the later Gothic style, containing a much admired pulpit, and monuments of the admiral Ruyter, the poet Vondel, and other eminent Dutchmen. The Oude Kerk is a Gothic building of the 14th century. The Jews possess nine synagogues. From its low situation, dampness, and deficiency of water, Amsterdam was formerly unhealthy,

but much has been done in the way of sanitary improvement, and the death-rate is now low. Water is now brought in abundance from the sand-hills near Haarlem. Amsterdam has long been famous for its banks and insurance companies. (See BANK.) Among the most important of its industrial establishments are ship-yards, rope and sail works, tobacco manufactories, sugar-refineries, breweries and distilleries, linen and woollen factories. The cutting and polishing of diamonds is an art in which the workmen of Amsterdam have long had a reputation. The harbour of Amsterdam lies along the whole of the north side of the city, and is surrounded by various docks and basins, the principal of which are the Oosterdok and the Westerdok, with accommodation for 1000 large vessels. The trade, already great, has been very much increased by the ship-canal (opened 1876) which connects the Y with the North Sea at Ymuiden. The length of this canal is 18 miles, the breadth varying from 240 to 400 feet. The canal has been enlarged since first made, and vessels drawing 30 feet of water and 700 feet in length can enter and leave at any time. Amsterdam has since 1825 been connected with the open sea by another canal, the North Holland Canal, extending to the extreme point of North Holland, and having a length of 50 miles. This canal relieved large vessels from the necessity of unloading before they could enter the harbour, and of encountering the passage through the Zuider Zee, which is peculiarly difficult. Another important canal, 45 miles long, gives communication with the Lek and Waal, going by way of Utrecht and Vreeswyk to Gorkum. In 1908 there entered the port of Amsterdam 2261 vessels of 2,267,546 tons, while 2271 of 2,265,285 tons cleared. Of the tonnage entered 714,170 was British, 941,027 Dutch, and 394,652 German. There is now ample railway communication. Amsterdam has given birth to many eminent persons; among others the philosopher Spinoza, the naturalist Swammerdam, the painters Adrian and Willem van der Velde, and Admiral Ruyter. Pop. in 1796, 217,000; in 1820, 180,000; in 1893, 446,657; in 1908, 564,000.

At the beginning of the thirteenth century Amsterdam was only a fishing village. Its prosperity dates from the latter part of the sixteenth century, when the United Provinces became an independent state, and the extensive commerce of Antwerp was in consequence of the oppression of Spain transferred to it, a number of merchants, artisans, and others driven from Flanders by Spanish misrule also taking up their residence here. The establishment of the East Indian Company also increased its commerce, and it grew so rapidly that in 1622 it contained 100,000 inhabitants. The burgomasters of Amsterdam acquired so much weight in the assembly of the states-general that their authority during the eighteenth century rivalled that of the hereditary stadtholder. During this period of prosperity Amsterdam acquired so great wealth that it surpassed every other city in Europe. It was the great market of all the productions of the East and West, and its harbour was always full of ships. After the change of government in 1795, when it came under French rule, the trade and wealth of Amsterdam continually diminished, the forced alliance of Holland with France, which obliged her to follow the French policy against the powers at war with France, operating to the great disadvantage of Amsterdam. The complete incorporation of Holland with France in 1810 entirely annihilated the foreign trade of Amsterdam; but it was restored by the revolution of 1813. Since that time its commerce has greatly increased. A successful international and colonial exhibition was held here in 1883.

AMSTERDAM, NEW, a town in British Guiana, in the district of Berbice, situated on the east or right side of the estuary of the river Berbice where the Canje enters it. It is built in the Dutch style, and intersected by numerous canals communicating with the sea. The houses are mostly of wood or bamboo, and each, with its allotment of ground, is separated from its neighbours by a ditch which fills and empties with the tide, thus preventing the accumulation of impurities. The town has three churches, a courthouse, barracks, commodious wharfs and warehouses, banks, &c. Pop. (1891), 8903.

AMSTERDAM ISLAND, a small and almost inaccessible island in the Indian Ocean, about halfway in a direct line between the Cape of Good Hope and Tasmania, in lat. 37° 58′ 30″ S.; lon. 77° 34′ 44″ E., about 60 miles to the north-east of the island of St. Paul, with which it has often been confounded. Both the islands were discovered by Van Diemen in 1633, and it is to him they owe their names. They were visited and examined by the Austrian frigate *Novara* in 1857 during her circumnavigation of the globe. The expedition could do little more than land on Amsterdam Island, as it is so steep and precipitous that it could not be ascended and thoroughly investigated. These islands now belong to France.

AMUCK (properly *amuk* or *amok*), signifies, in Malay, a furious and reckless onset, whether of many in battle, or of an individual in private. The word extends with the same signification through all the languages of the Malay Archipelago, and among the inhabitants of this region a peculiar monomania prevails in which individuals rush into the public thoroughfares, making indiscriminate and murderous assaults on all whom they meet. The cause of these manifestations of rage has not been satisfactorily explained. They have been attributed to opium, recklessness of life, revenge, and disorder of the digestive organs. The word has been adopted into English in the phrase *to run amuck*.

AMULET, a piece of stone, metal, or other substance, marked with certain figures or characters, which people wear about them as a protection against diseases and enchantments. The name, as well as the thing itself, is derived from the East. The word comes from the Arabic *hamalah* (anything hung round the neck). Among the Turks, and many people of Central Asia, every individual thinks an amulet necessary to secure him from harm. They were introduced into Christian Europe by the Jews. With the ancients, for example, the Egyptians, Greeks, Romans, they were frequently found. From the pagans they were introduced among the Basilidians. Their amulets were stones with the word *Abraxas* engraved on them. The Jews had many superstitious notions about amulets. Many Christians of the first century wore amulets, which were marked with a fish as a symbol of the Redeemer. To the Christian divines the use of amulets was interdicted by the Council of Laodicea under penalty of dismission from office. With the spread of Arabian science and astrology the astrological amulets of the Arabians, the talismans, came into use in the West. The small images of saints which the Neapolitian seamen, and almost all the Greeks, wear about them, are nothing but amulets. The Turks, the Chinese, the people of Thibet, and many other nations, have yet great confidence in them. See ABRAXAS and TALISMAN.

AMURATH, or MURAD, the name of several Ottoman sultans. See OTTOMAN EMPIRE.

AMYL AND DERIVATIVES. It is found that the general relations existing between a certain class of carbon compounds are best represented by writing the formulæ of these compounds as all containing the

group C_5H_{11}; to this group the name amyl is given. Thus we have amyl alcohol ($C_5H_{11}.HO$), amyl or amylic ether ($(C_5H_{11})_2O$), amylamine ($C_5H_{11}.NH_2$), &c. &c. The group C_5H_{11} has not itself been isolated, nor is it at all probable that it will ever be obtained in the free state. Of the amyl compounds the alcohol is perhaps the most important. It occurs as one of the products of the fermentation of grain, &c., and is commonly known by the name of fusel-oil (which see). The pure alcohol is a colourless liquid, possessed of a suffocating odour; it is somewhat lighter than water; when ignited it burns with a smoky flame. The nitrite of amyl is an ethereal liquid of an agreeable odour, and is used as a medicine in angina pectoris and asthma.

AMYRIDACEÆ, a natural order of tropical plants, consisting of trees or shrubs, with opposite or alternate compound leaves, frequently stipulate and dotted; the flowers are usually bisexual, but are sometimes unisexual by abortion; calyx persistent, regular, or nearly regular, with two to five divisions; petals 3–5, inserted at the base of the calyx; æstivation valvate or imbricated; stamens perigynous, twice or four times as many as the petals; ovary superior, sessile, 1–5-celled; ovules in pairs, anatropal, pendulous or suspended; style one or none; stigma simple or lobed, sometimes capitate; fruit dry, 1-celled, indehiscent, or the epicarp splitting into valves; seeds solitary, exalbuminous, with superior radicle next the hilum, and with fleshy or wrinkled cotyledons. They yield resinous and balsamic juices, which are sometimes used medicinally, and receive such names as bdellium, elemi, frankincense, myrrh, olibanum, tacamahac. (See these articles.) Among the chief genera of the order are *Amyris*, *Balsamodendron*, *Boswellia*, *Canarium*, and *Icica*. They are sometimes classed as a sub-order of Anacardiaceæ.

ANA, a Latin adjective termination which, when used in connection with a personal name, marks a collection of the sayings of the particular person, or of anecdotes relating to him. The Scaligerana were the first compilation which appeared under a Latinized title of this kind (1666). Since that time they have become common, particularly among the French. Among English collections are such as Walpoliana, Bæoniana, Parriana, &c. From such a common usage *ana* has come to be employed also as an independent word. See Mohr's De la Bibliographie des Ana (Brussels, 1882).

ANABAPTISTS (Greek *anabaptizein*, to re-baptize), a name given to a peculiar sect that arose in early Reformation times, their opponents so designating them on the ground that they re-baptized those who joined their body. In the middle ages the rite of infant baptism was declared to be unscriptural by various parties, as the Petrobrusians, Catharists, Picards, &c.; but in the prevailing church it was retained. In 1521, when the progress of the Reformation had opened the way to new opinions, some enemies of infant baptism appeared at Zwickau, in Saxony, united partially with the rebels in the Peasants' war, and were completely separated, by their lawless fanaticism, from the Protestant cause. With the baptism of adults, performed even by laymen, they connected principles subversive of all religious and civil order. They acknowledged neither ecclesiastical nor civil authority; and attempted to bring about a perfect equality of all Christians. They professed to have immediate revelations from heaven through a so-called 'inner light' which they set above the authority of the church, and even of the Bible; though, on the other hand, they were most rigid adherents to the letter of the Scriptures, and carried attempts to regulate their conduct by biblical models to the height of caricature. They maintained that no Christian should engage in a legal process, hold any civil office, take an oath, or hold any private property. The vast increase of their adherents from the year 1524, especially among the common people on the Rhine, in Westphalia, Holstein, Switzerland, and the Netherlands, was soon met by severe measures on the part of the magistrates. After 1525 imperial and ecclesiastical decrees were issued against the Anabaptists in Germany, and many were put to death, after being urged to recant. The same happened in Switzerland and in the Netherlands. Still, new associations of this sect were perpetually formed by itinerant prophets and teachers. Johann Bockhold or Bockleson, a tailor of Leyden, aged twenty-six, and John Matthias or Matthiesen, a baker of Haarlem, came in 1533 to Münster in Westphalia, a city which had adopted the doctrines of the Reformation. Here they soon gained over a portion of the excited populace, and among the rest Rothmann, a Protestant clergyman, and the counsellor Knipperdolling. The magistrates in vain excluded them from the churches. They obtained possession of the council-house by violence. Their numbers daily increased, and towards the end of the year they extorted a treaty securing the religious liberty of both parties. Being strengthened by the accession of the restless spirits of the adjacent cities, they soon made themselves masters of the town by force and expelled their adversaries. Matthias came forward as their prophet, and persuaded the people to devote their gold and silver and movable property to the common use, and to burn all their books but the Bible. But in a sally against the Bishop of Münster, who had laid siege to the city, he lost his life. He was succeeded in the prophetic office by Bockhold and Knipperdolling. The churches were destroyed, and twelve judges were set over the tribes, as in Israel; but even this form of government was soon abolished, and Bockhold, under the name of *John of Leyden*, raised himself to the dignity of King of *New Zion* (so the Anabaptists of Münster styled their kingdom), and caused himself to be formally crowned. From this period (1534) Münster was a theatre of all the excesses of fanaticism, lust, and cruelty, with Bockhold as the ruling spirit. At last, however, with the assistance of several Protestant princes, the city was taken, June 24, 1535, though not without a brave defence, in which Rothmann and others were killed, and the kingdom of the Anabaptists destroyed by the execution of the chief men. Bockhold and two of his most active companions, Knipperdolling and Krechting, were tortured to death with red-hot pincers, and then hung up in iron cages on St. Lambert's steeple at Münster as a terror to all rebels. In the meantime, some of the twenty-six apostles, who were sent out by Bockhold to extend the limits of his kingdom, had been successful in various places, and many independent teachers, who preached the same doctrines, continued active in the work of founding a new empire of pure Christians, and propagating their visions and revelations in the countries abovementioned. It is true that they rejected the practice of polygamy, community of goods, and intolerance towards those of different opinions which had prevailed in Münster; but they enjoined upon their adherents the other doctrines of the early Anabaptists, and certain heretical opinions in regard to the humanity of Christ, occasioned by the controversies of that day about the sacrament. The most celebrated of those Anabaptist prophets were Melchior Hoffmann and David Joris. The former, a furrier from Swabia, first appeared as a teacher in Kiel, in 1527; afterwards, in 1529, in Emden; and finally in Strasburg, where, in 1540, he died in prison. He formed, chiefly by his magnificent promises of a

future elevation of himself and his disciples, a peculiar sect, whose scattered members retained the name of *Hoffmannists* in Germany, till their remains were lost among the Anabaptists. They have never owned that Hoffmann recanted before his death. David Joris, or George, a glass-painter of Delft, born 1501, and rebaptized in 1534, showed more depth of mind and warmth of imagination in his various works. Amidst the confusion of ideas which prevails in them, they dazzle by their elevation and fervour. In his endeavours to unite the discordant parties of the Anabaptists he collected a party of quiet adherents in the country, who studied his works (as the Gichtelians did those of Böhme), especially his book of miracles, which appeared at Deventer in 1542, and revered him as a kind of new Messiah. Unsettled in his opinions, he travelled a long time from place to place, till at last, to avoid persecution, in 1554 he became a citizen of Basel, under the name of *John of Bruges*. In 1556, after an honourable life, he died there, among the Calvinists. In 1559 his long-concealed heresy was first made public. He was accused, though without much reason, of profligate doctrines and conduct, and the Council of Basel condemned him and ordered his body to be burned. A friend of Joris was Nicholas, the founder of the Familists, who do not belong, however, to the Anabaptists. After the disturbances at Münster an opinion slowly gained ground among the Protestants, that no heretic should be punished with death unless he was guilty of exciting disturbances; hence these and similar parties of separatists were permitted to remain unmolested, provided they continued quiet. But till after the middle of the sixteenth century prophets were constantly rising up among the Anabaptists, and subverting civil order. Of the heretics executed by Alva in the Spanish Netherlands a large proportion were Anabaptists. In fact, they were never worthy of toleration till quiet and good order were introduced among them. The institutions of Menno were the first occasion of this change. This judicious man, about the middle of the sixteenth century, united them in regular societies, which formed an independent church, under the name of *Mennonites*, *Mennists*, or *Anabaptists*, as they are still called in the north of Germany and in Holland, imitating strictly the peculiarities of the primitive apostolical church. But he could not prevent the division which took place among them as early as 1554, in regard to the degree of severity necessary in case of excommunication. The stricter party punished every individual transgression against morality and church order with excommunication, and carried their severity so far that near relations, even husbands and wives, were obliged to renounce all connection with one another, in case of such punishment. The more moderate party resorted to excommunication only in case of long-continued disobedience to the commands of the Holy Scriptures. Moreover, they never inflicted this punishment till after various kinds of warnings and reproofs (*gradus admonitionis*), and even then it did not extend beyond the relation of the individual excommunicated with the church. As neither party would yield, and the strict often excluded the moderate from their communion, the Anabaptists have continued to this day divided into two parties. The moderate party were called *Waterlanders*, because their earliest congregations lived in the Waterland, on the Pampus in the north of Holland, and in Franeker. By the strict party they were styled the *Gross*, and even the *Dung-carts*, as a designation of their inferior purity. This latter party, who consisted of the Frieslanders in and about Emden, Flemish refugees (Flemingians), and Germans, called themselves the *Pure* (*Die Feinen*), or the *Blessed*, the *Strict*. Menno did not wholly adopt the excessive rigour of the Pure, nor yet would he abandon the Frieslanders, among whom he taught. Immediately after his death, in 1565, a contest broke out among the Pure, and they divided into three parties. Of these, the Flemingians were more severe and fanatical than the rest, and maintained the utmost severity in regard to excommunication; the Frieslanders did not indeed exercise this discipline on whole congregations, nor extend the curse in the case of individuals to the destruction of their family relations; the Germans were distinguished from the Frieslanders only by more carefully avoiding all luxury. To the party of these Germans belonged those who were settled in Holstein, Prussia, Dantzig, the Palatinate of the Rhine, Juliers, Alsace, and Switzerland, and the numerous Anabaptists who inhabited Moravia till the Thirty Years' war. In 1591 they were united again with the Frieslanders by means of the Concept of Cologne, so called, or articles of faith, chiefly because their separation was injurious to commerce, in which the Anabaptists soon became much engaged. With these two sects, thus connected, after many attempts towards reconciliation and friendship, the strictest Anabaptists at length joined themselves, and certain articles of faith were adopted by the whole body. But these arrangements were insufficent to check the bitterness with which they persecuted one another. Soon after the union of the Frieslanders with the Germans a large number of malcontents left the former, because they were displeased with this connection and the laxness of the church discipline. Under Jan Jakob, their teacher, they constituted a separate church on the most rigid principles. They were not numerous. During the negotiations of the Flemingians with the Frieslanders there appeared among the former a Friesland peasant, Uke Wallis, who held the opinion that Judas and the high-priests were blessed, because in the murder of Jesus they had executed the designs of God. In 1637 he collected a party of individuals who adopted this opinion, but still remained distinct from the other Anabaptists, on account of their aversion to the excessive strictness of the ancient Flemingians. The Uke-Wallists or *Groningenists*, so called because the sect arose in the territory of Groningen, received the malcontents of the united parties, and therefore called themselves emphatically the *ancient Flemingians* or the *ancient Frieslanders;* but by their adversaries they were denominated the *Dompelers*, that is, *Dippers*, because some of their churches used, in baptism, the threefold immersion of the whole body. The other Anabaptists, on the contrary, regarded the sprinkling of the head as sufficient. Beyond Friesland, though not numerous, they spread to Lithuania and Dantzig. The Anabaptists in Galicia, a part of the ancient Moravia, who were divided, on account of their dress, into Buttoners (those who buttoned their clothes) and Pinners (those who used wire-pins instead of buttons, and wore long beards), and comprehended about twenty-four families of the simple country people, agreed with the Uke-Wallists in maintaining the ancient doctrines and strict exercise of excommunication, and were distinguished for purity of morals. The ancient Flemingians, or the strictest sect of Anabaptists, persevere firmly in the ancient doctrines and practices of the sect. They reject the word *person* in the doctrine of the Trinity, and explain the purity of the human nature in Christ, according to Menno, by saying, that he was created out of nothing by God in the womb of Mary, although he was nourished by the blood of the mother. They view the baptism of their own party as alone valid, and practise the washing of feet as an act commanded by Christ, not only towards

travellers of their own party, like the Pure, but even in religious assemblies. Like Anabaptists in general, they view as improper, oaths, the discharge of civil offices, and all defence of property, liberty, or life, which requires violence against their fellowmen. Hence they were formerly called, without distinction, the *unarmed Christians*. Only in this particular, and in church-discipline, are the ancient Flemingians more strict than the other Anabaptists. Immorality, the bearing of arms, marriage with a person out of their church, extravagance in dress or furniture, they punish by excommunication, without *gradus admonitionis*, and extend their discipline to domestic life. Those of Dantzig excluded persons who had their portraits painted, as a punishment for their vanity. In general, they strive to imitate, with the utmost exactness, the simplicity and purity, and the alleged democracy of the earliest apostolic church, the restoration of which was originally the object of every Anabaptist. Hence they appoint their teachers by a vote of the whole church, forbid them to enjoy any political office, and place but little value on learning. In modern times, it is true, they have gradually remitted their severity, and given up in particular the rebaptism of proselytes from other Anabaptist sects; while Christians, who have only been baptized in infancy, are admitted into any sect of the Anabaptists only after rebaptism.—The Flemingians, Frieslanders, and Germans, who had united, 1649, and at first belonged also to the Pure, gradually sided with the moderate party, with which they are now reckoned. A division took place in the general church of the united Waterlanders, Flemingians, Frieslanders, and Germans in 1664, on account of the favour with which a part of them regarded the doctrines of the Remonstrants. Galenus Abrahamssohn, of Haen, a learned physician and teacher of the Anabaptists, of a gentle disposition and distinguished talents, was the leader of this new party, which was called after him the sect of the *Galenists*. He maintained that sound doctrine is less decisive of Christian worth than a pious life; and therefore church-communion should be refused to no virtuous person believing in the Scriptures. But he betrayed by these opinions his Socinian views of Christ and the Holy Ghost. Samuel Apostool (also a physician and teacher of the church) and the orthodox party in it declared themselves opposed to such innovations, and determined to maintain their ancient faith and discipline. Besides the branches of the ancient Flemingians, or the proper Pure, described above, there are now two leading parties of Anabaptists—the Apostoolians, who, from their attachment to the ancient confessions, founded on the doctrines of Menno, are called *Mennonites*, in a more limited use of that word; and the Galenists, who are likewise styled *Remonstrants* and *Arminian Baptists*, after Arminius, the founder of the Remonstrants. The Mennonites, as they belong to the moderate party, no longer maintain Menno's doctrine of the creation of Christ in the womb of Mary; they rebaptize no proselyte, and punish none but gross crimes with excommunication, and that not without previous warning. They do not require church-members utterly to avoid the excommunicated. They carefully prohibit oaths, military service, and the holding of civil offices. The confession of faith of the true Mennonites, composed by Cornelius Riss, one of their teachers, and published in German, at Hamburg, in 1776, corresponds in almost every point with the doctrines of the Calvinist Church. The Remonstrants have departed the most widely from the faith and order of the ancient Anabaptists. They reject all symbolical books, and permit the most unrestrained reading; they also have among them many Socinians. They tolerate, in the bosom of the church, those of a different faith, and receive Christians of all creeds, but only in a few congregations without rebaptism. They consider the Pure and Mennonites as brethren; seldom exclude members, except from the sacrament, and this not so frequently as the latter parties; permit military service and the discharge of civil offices, and even an oath of testimony, and prohibit only the oath of promise. They allow of learning, and have erected a seminary at Amsterdam for the education of ministers, to which young men of the Mennonite party are also admitted. In Holland, where there are over 100 congregations, the Anabaptists obtained toleration under William I., and complete religious liberty in 1626. The Anabaptists in Germany, where they are most numerous, on the banks of the Rhine, in East Prussia, Switzerland, Alsace, and Lorraine, consider themselves proper Mennonites. In the religious worship of all these parties there is but a trifling difference from the forms of the Protestant service; but they more nearly resemble the Calvinists than the Lutherans. The Pure have elders or bishops who administer the sacraments, ministers who preach, and deacons or almoners. All these officers are chosen by the vote of the churches. The Mennonites have ministers or deacons, the former of whom are the proper pastors, and the latter only exhorters or preachers; but both are chosen by the ecclesiastical council or presbytery. In general, the Anabaptists still deserve the praise formerly bestowed upon them of diligence, industry, order, and purity of morals. Many of them, however, have become so accustomed to the manners of the world that the peculiarities of this sect have gradually worn away, and the sect itself seems hastening to decay. The Baptists in England form a distinct sect, without any connection with the successors of the ancient Anabaptists.

ANABAS. See CLIMBING-PERCH.

ANABASIS ('a going up'), the Greek title of Xenophon's celebrated work, which gives an account of the expedition of Cyrus the Younger against his brother Artaxerxes, king of Persia. (See XENOPHON.) The title of Anabasis is also given to Arrian's work which records the campaigns of Alexander the Great.

ANABLEPS, a genus of malacopterous fishes of the perch family (Cyprinidæ) found in the rivers of Guiana, and remarkable for a peculiar structure of the eyes, which makes them appear double, and has given rise to fabulous accounts of fish with four eyes. The peculiarity is caused by a division of the iris and cornea, by transverse ligaments forming two pupils, and making the whole eye appear double, though there is only one crystalline humour, one vitreous humour, and one retina. No other vertebrate animal possesses a similar structure. The young are brought forth alive. The only species (*A. tetrophthalmus*) has a flat head with blunt snout, a projecting upper jaw, and a cylindrical body covered with strong scales.

ANACARDIACEÆ, a natural order of plants consisting of tropical trees and shrubs, one of the principal characteristics of which is that they secrete an acrid resinous juice, which is often used as a varnish, as it turns hard and black when dry. They have alternate leaves and inconspicuous flowers, with calyx in five segments, and an equal number of perigynous petals; fruit generally in the form of a drupe. Mastic, Scio turpentine, and Martaban varnish are some of their products. The cashoo, the pistacia, sumach, &c., are members of the order.

ANACHARIS, a genus of plants of the natural order Hydrocharidaceæ or floating plants. It is a native of North America, and a species (*Anacharis alsinastrum*) has been introduced into Great Britain. It was first observed about 1842, and has propagated with amazing rapidity, appearing in distant places,

while the means of its transportation are still unknown. It destroys the beauty of ornamental waters, and in some cases impedes the navigation of canals and rivers. Its stems are much branched, and bear small pellucid leaves in whorls of three or four, and inconspicuous flowers. The flowers only appear above the water at the time of fertilization. It propagates from cuttings or fragments either of the stem or roots with such rapidity that no means of extirpating it have been found effectual. Swans devour it with great avidity, but the torn fragments they leave serve to propagate the plant afresh. In some places it is said to have died out from exhaustion of the soil, and on the whole it has not caused so much trouble as was at one time anticipated. It shelters fish spawn and fry, and keeps the waters in which it grows pure and clear.

ANACHARSIS, in Grecian tradition, a Thracian of royal birth, whose love of knowledge induced him to leave his barbarous country and travel among the more civilized nations. In the time of Solon he visited Athens, from whence he proceeded to other countries. Though a 'barbarian' (that is, non-Greek) he received the Athenian franchise. He is reported to have been killed by his brother, the Thracian king, to prevent the introduction of Greek customs. J. J. Barthélemy's well-known Voyage du jeune Anacharsis en Grèce is an attempt to describe ancient Greek life and manners in the third century B.C.

ANACHRONISM, a term derived from the Greek, and applied to errors of chronology by which events are brought into false relation with each other, as when Shakespeare, in Troilus and Cressida, makes Hector quote Aristotle—

> 'Paris and Troilus, you have both said well;
> And on the cause and question now in hand
> Have glozed—but superficially; not much
> Unlike young men, whom Aristotle thought
> Unfit to hear moral philosophy'.

ANACOLUTHON, in grammar and rhetoric, a want of sequence or due connection in the structure of a sentence often arising from carelessness. Such an irregularity may proceed from passionate feeling, and the anacoluthon may then become a beauty. The following from Paradise Lost (i. 84) is an example:

> 'If thou beest he—but O, how fallen! how changed', &c.

ANACONDA (*Eunectes murinus*), a large serpent of the boa family, common in intertropical America, and by some included in the genus *Boa*. It has the nostrils opening on the upper surface of the extremity of the muzzle, and looking directly upwards; they are small, situated near each other, and capable of being completely shut, so as to suit the aquatic habits of the animal. The nostrils are surrounded by three plates; plates cover the anterior half of the top of the head, and scales the posterior; the body scales are small, flat, and smooth, lozenge-shaped, and nearly of the same size, except on the sides, where they are three or four times larger than the others. The head is comparatively small, conical, very flat below, and truncated in front. The colour is grayish-brown or olive above, with two rows of large black spots running down the back and tail; the sides are adorned with black rings on a yellow ground; the under surface is ochre-yellow with black spots. The anaconda is the largest of living snakes, sometimes reaching a length of over 30 feet. Brazil and Guiana form its chief habitat. It always lives in or in the neighbourhood of water. It lies in wait for its prey in the water, or stretched on the sand, on a rock, or on the trunk of a fallen tree. Fish, iguanas, agoutis, monkeys, and other quadrupeds are its food. It seldom attacks man. During the dry season it buries itself in the mud of dried-up streams and becomes torpid. Its skin is made into shoes, bags, &c.; its body contains a large quantity of fat, from which oil is produced, and its flesh is eaten.

ANACREON, whom the Greeks esteemed one of their greatest lyric poets, was born at Teos, in Ionia, probably about 560 B.C. He seems to have emigrated with the rest of his fellow-citizens to Abdera, in Thrace, when Teos was taken by Harpagus, the general of Cyrus (540 B.C.). He subsequently lived at the court of Polycrates, tyrant of Samos, whose favour he enjoyed, and whom he celebrated in his songs. After the death of his protector he went to Athens, at the invitation of Hipparchus, who sent a fifty-oared galley to fetch him. The fall of the latter drove him from Athens, and probably he returned to Teos. He passed a gay and happy old age, and died in his eighty-fifth year, but whether at Abdera or Teos is uncertain. According to tradition he was choked by a grape-stone. The city of Teos put his likeness upon its coins; his statue was placed on the Acropolis in Athens, and he was held in honour throughout Greece. Only some fragments of his works have come down to us, and these may be found in Bergk's Poetæ Lyrici Græci. The collection of sixty-eight odes that usually passes under the name of Anacreon is mostly the production of a later time, and the individual poems are at best but imitations of those of Anacreon. English translations of these anacreontics have been made by Cowley, Fawkes, and Thomas Moore.

ANADYOMENE (Greek, 'she who comes forth'), a name given to Aphroditē (Venus) when she was represented as rising from the sea. Apelles painted her rising from the waves, and according to some writers Campaspe, the mistress of Alexander, according to others the famous courtesan Phryne, served him as a model. This picture was painted for the temple of Æsculapius at Cos, and is said to have cost 100 talents. It was placed by Augustus in the temple dedicated by him to Julius Cæsar at Rome. In the reign of Nero it had become greatly faded.

ANADYR, the most easterly of the larger rivers of Siberia and of all Asia. It rises in Lake Ivashka, in the Stanovoi Mountains, flows first west, and then east, and falls into the gulf of the same name, after a course of about 600 miles. In 1893 the province of Anadyr was constituted.

ANÆMIA (Greek, 'want of blood'), a medical term applied to an unhealthy condition of the body, in which there is either a diminution of the total quantity of blood in the system, or in the red corpuscles which it contains. The latter is the most usual meaning of the word. During this complaint the red corpuscles are sometimes only a fifth part of what the blood contains in its normal state. The principal symptoms are paleness and general discoloration of the skin and mucous membranes, languor, emaciation, want of appetite, painful digestion, singing in the ears, fainting, palpitation, &c. Anæmia may be brought on by loss of blood, insufficient nourishment, residence in humid and unhealthy localities, the respiration of vitiated air, &c.; or it may result from some chronic malady, such as pulmonary consumption. Simple anæmia is not generally attended with any danger. The cause of the disease must first, of course, be removed or counteracted; and fresh air, good nutriment, tonics, and above all the preparations of iron, must be prescribed. Anæmia is more common amongst women than among men.

ANÆSTHETICS are medical agents employed for the removal of pain, especially in surgical operations, by suspending or diminishing physical sensibility. There does not appear to be any exact distinction between the terms anodyne and anæsthetic,

though the latter is commonly applied to agents used to produce temporary insensibility during surgical operations, the former to the slower methods employed for relieving chronic or protracted pain in maladies by means of opiates. Various agents have been employed for both of these purposes from the earliest times, narcotics and alcoholic stimulants having early been observed to affect sensibility to pain. The use of these agents in surgical operations is, however, attended with such inconvenience that it has always been sparingly resorted to by surgeons. When the progress of chemical science led to the investigation of the properties of gases, it occurred to various inquirers that these might be found serviceable in medical science, and the anæsthetical effects of various gases began to be observed towards the close of the 18th century. In 1800 Sir Humphry Davy made experiments on the anæsthetic properties of nitrous oxide, and recommended its use in surgery. The suggestion, however, bore no immediate fruit. In 1818 Faraday established the same fact in regard to sulphuric ether. Further experiments were made on the same agents by several physicians, particularly in America, but for a good many years yet no advance was made beyond the region of experiment. In 1844 Dr. Wells, a dentist of Hartford, Connecticut, applied the inhalation of sulphuric ether in the extraction of teeth, but owing to some misadventure did not persevere with it. The example was followed in 1846 by Dr. Morton, a Boston dentist, who also extended the use of ether to other surgical operations. The practice was soon after introduced into England by Mr. Liston, and a London dentist, Mr. Robinson. A few weeks later Sir James Simpson made the first application of ether in a case of midwifery. This was early in 1847. Towards the end of the same year Simpson had his attention called to the anæsthetic efficacy of chloroform, and announced it as a superior agent to ether. This agent has since been the most extensively used anæsthetic, though the use of ether still largely prevails in the United States. The use of ether and chloroform were introduced in France nearly at the same time as in England. The inhalation of the vapours of ether, chloroform, and nitrous oxide produces general anæsthesia by acting upon the brain and sensory nerves. Local anæsthesia is produced by isolating the part of the body to be operated upon, and producing insensibility of the nerves in that locality. The most effective means of producing local anæsthesia is by the production of extreme cold. Dr. Richardson's method is to apply the spray of ether, which, by its rapid evaporation, chills and freezes the tissues and produces complete anæsthesia. This mode of treatment, besides its use in minor surgical operations, has various remedial applications. Cocaine is also common as a local anæsthetic. Surgeons recognize two stages in the application of anæsthetics, the first, of excitation, or imperfect anæsthesia; the second, of complete anæsthesia, or sleep. When the second stage is reached the greatest care is necessary to avoid over-administration, which will be attended by suspension of the organic functions of respiration and circulation, producing stupor, rapidly followed by death. When due care is taken, however, the state of nervous insensibility may be continued for a considerable time without affecting the vital functions. The administration of chloroform is attended with rather more risk than that of ether, but is otherwise easier and more effective. There is still some difference of opinion among theorists as to the mode of operation of etheric anæsthetics. The prevalent opinion is that they act directly upon the nervous centres, but there is a counter-hypothesis that they operate directly upon the tissue of the lungs, producing incipient asphyxia. The use of anæsthetics not only relieves pain in long and severe operations, but affords greater liberty to the surgeon, and thus diminishes the risk of accidents. Though not entirely free from danger, the direct accidents due to their use are few, and they have considerably diminished the mortality attending difficult surgical operations.

ANAGNI (Latin, *Anagnia*), a wretched town of Italy, in the province of Rome, 12 miles north-west from Frosinone, the birthplace of several popes, and the seat of a bishopric erected in 487. Pop. 8220.

ANAGRAM (from the Greek *ana* and *gramma*), in its proper sense, the letters of one or several words read backwards; thus, *evil* is an anagram of *live*. In a wider sense it means a transposition of letters, to form a new word or phrase; for instance, *tone* and *note*. An anagram is called *impure*, if, in their transposition, all the letters of the given words are not used. Anagrams are generally too tedious, far-fetched, and inappropriate for wit, but sometimes a superstitious value has been attached to such plays upon words.

ANAHUAC, an aboriginal Mexican name, signifying 'near the water,' and applied to the plateau of the city of Mexico, from the lakes situated there. This was the region which was anciently inhabited by the Aztecs. It comprises about three-fifths of the Republic of Mexico, and lies between lat. 15° and 30° N.; lon. 95° and 110° W. Its general elevation is from 6000 to 9000 feet above the sea. Many lofty mountains and some stupendous volcanoes, such as Jorullo and Popocatepetl, rise above its surface.

ANAKIM, the posterity of Anak, the son of Arba, noted in sacred history for their fierceness and loftiness of stature, which filled the minds of the Israelitish spies with dismay when sent by Moses to examine the land of Canaan. Their stronghold was Kirjath-arba or Hebron, which was taken and destroyed by Caleb and the tribe of Judah. The term has become proverbial for great stature. It has been conjectured, not without probability, that Goliath and the Philistine giants belonged to the race of the Anakim.

ANALECTA (from the Greek *analego*, I gather), selections or extracts from different works; for example, analecta of philosophy, of history, and of literature. Brunck gave this name to his collection of the smaller Greek poems. See ANTHOLOGY.

ANALOGY is the mode of reasoning from resemblance to resemblance. When we find on attentive examination resemblances in objects apparently diverse, and in which at first no such resemblances were discovered, a presumption arises that other resemblances may be found by further examination in these or other objects likewise apparently diverse. It is on the belief in a unity in nature that all inferences from analogy rest. If there were no unity in nature there would be no ground of expectation that resemblances in one part of the constitution of nature would be paralleled by resemblances in another; and however numerous the particular resemblances found, we could not draw from them the slightest presumption as to any new resemblances. To do so would be to draw an analogy where it is admitted that no analogy exists. That which distinguishes analogical reasoning from syllogistic is, that the former is always general, and never can properly or legitimately have a particular conclusion. When analogical reasoning ends in a particular conclusion, the resemblance is either proved to result from actual identity of cause or dependence, and the reasoning becomes syllogistic, or the analogy is false, that is to say, the inference drawn from the resemblance is unproved. The general inference from analogy is always perfectly valid. Wherever there is resemblance, similarity

or identity of cause somewhere may be justly inferred; but to infer the particular cause without particular proof is always to reason falsely. Analogy is of great use and constant application in science, in philosophy, and in the common business of life. In science analogy is the source of all hypothesis and the precursor of all discovery. It is from the assumption of resemblance between the known and the unknown that every problem in science takes the form, and every inquiry the direction that leads to its determination. In common life, where affairs are determined with less exactitude, analogy is more or less the guide of almost every action, and forms a larger or smaller part of the data of almost every conclusion. The danger of reasoning from analogy is well known but seldom sufficiently attended to.

ANALYSIS, in philosophy, the mode of resolving a compound idea into its simple parts, in order to consider them more distinctly, and arrive at a more precise knowledge of the whole. It is opposed to *synthesis*, by which we combine and class our perceptions, and contrive expressions for our thoughts, so as to represent their several divisions, classes, and relations. Analysis is regressive, searching into principles; synthesis is progressive, carrying forward acknowledged truths to their application.

Analysis, in mathematics, is, in the widest sense, the expression and development of the functions of quantities by calculation. There are two ways of representing the relations between quantities, namely, by construction and by calculation. Pure geometry determines all magnitudes by construction, that is, by the mental drawing of lines, whose intersections give the proposed quantities; analysis, on the contrary, makes use of symbolical formulæ, called *equations*, to express relations. In this wider extent of the idea of analysis, algebra, assisted by literal arithmetic, appears as the first part of the system. Analysis, in a narrower sense, is distinguished from algebra, inasmuch as it considers quantities from a different point of view. While algebra speaks of the known and the unknown, analysis treats of the unchanging or constant, and of the changing or variable. The algebraic equation, $x^2+ax-b=0$, for example, seeks an expression for the unknown x by means of the known a and b; but the analytical equation, $y^2=ax$, expresses the law of the formation of the variable y, by means of the variable x, together with the constant a. The analysis of the ancients was exhibited only in geometry, and made use only of geometrical assistance, whereby it is distinguished from the analysis of the moderns, which, as before said, extends to all measurable objects, and expresses in equations the mutual dependence of magnitudes. Analysis is divided into lower and higher, the lower comprising, besides arithmetic and algebra, the doctrines of functions, of series, combinations, logarithms, and curves, the higher comprising the differential and integral calculus, the calculus of variations, &c.

ANALYSIS, CHEMICAL, the term applied to the processes by which the chemist seeks to determine the nature and quantity of the various elementary bodies, or groups of elements, which together constitute any compound substance. Analysis is divided into two branches, *qualitative* and *quantitative*; the former has for its object a determination only of the nature of the constituents of a substance, the latter seeks to determine the proportions also of these constituents. In qualitative analysis methods are adopted by which the elementary substances are divided into groups, the members of each group having some one property in common; these groups are further subdivided into sections, and these again into sub-sections. In quantitative analysis the elementary substance to be estimated is obtained in the form of a salt of well-known constitution, and possessed of such properties as enable it to be easily collected and accurately weighed; from the weight of such a salt the amount of the element, the quantity of which it is desired to estimate, is readily calculated. Quantitative analysis includes *volumetric* and *gravimetric* analysis, the former seeking to determine proportions by means of the volumes of known solutions used as reagents, the latter by weighing with the balance.

ANAM, or ANNAM, a country of Asia occupying the east side of the South-eastern or Indo-Chinese Peninsula, along the China Sea, having a length of about 850 miles, with a breadth varying from over 400 miles in the north to 100 in the middle. It is composed of Tonquin (Tongking) in the north; Cochin-China and Chiampa in the south; and adjoining territories of the Laos and other semi-independent tribes. The total area is 170,000 square miles, and the population 15,000,000, of whom 9,000,000 are in Tonquin. In a narrower sense the name Anam is now used to exclude Tonquin and as equivalent to the country extending from it southwards to French Cochin-China, this region forming a semi-independent kingdom under a native ruler. The coast is considerably indented, especially at the mouths of the rivers, where it affords many commodious harbours. Tonquin is mountainous on the north, but in the east is nearly level, terminating towards the sea in an alluvial plain yielding good crops of rice, cotton, fruits, ginger, and spices, and a great variety of varnish-trees, palms, &c. The principal river is the Song-ka, or Red River. An important natural feature of Anam (in the narrow sense) is the range of mountains that runs parallel to the coast, sending short rivers to the sea and longer ones inland to the Mekong. It is, generally speaking, unproductive, but contains many fertile spots, in which grain, leguminous plants, sugar-cane, cinnamon, &c., are produced in great abundance. Agriculture is the chief occupation, but many of the inhabitants are engaged in the spinning and weaving of cotton and silk into coarse fabrics, the preparation of varnish, iron-smelting, and the construction of ships or junks. The inhabitants are said to be the ugliest of the Mongoloid races of the peninsula. Their language is monosyllabic, and is connected with the Chinese. The religion of the majority is Buddhism, but the educated classes hold the doctrines of Confucius. Huë is the capital. Anam was conquered by the Chinese in 214 B.C., but in 1428 A.D. it completely won its independence. The French began to interfere actively in its affairs in 1847 on the plea of protecting the native Christians. By the treaties of 1862 and 1867 they obtained the southern and most productive part of Cochin-China, subsequently known as French Cochin-China; and in 1874 they obtained large powers over Tonquin, notwithstanding the protests of the Chinese. Finally, in 1883 Tonquin was ceded to France, and next year Anam was declared a French protectorate. After a short period of hostilities with China the latter recognized the French claims, and Tonquin is now directly administered by France, while Anam is entirely under French direction.

ANANAS. See PINE-APPLE.

ANANYEV, a town of Russia, in the government of Kherson, on the Tiligol, 95 miles north-west of Odessa. It has a trade in grain. Pop. 13,000.

ANAPA, a seaport and formerly a fortified town of Russia, in the Caucasus, on the Black Sea, about 60 miles south-east of the Strait of Kertch, with a considerable export of grain. Pop. 9000.

ANAPÆST, in prosody, a foot consisting of two short and one long syllable. See RHYTHM.

ANARAJAPOORA. See ANURADHAPURA.

ANARCHY (Greek, *anarchia*, absence of government), a state of society where there is no established government, or at least no effective one. Anarchy pure and simple has scarcely ever existed anywhere unless among savages, though after revolutions which have been violently and suddenly effected an approximation to such a state of things may have arisen. See ANARCHISTS in SUPP.

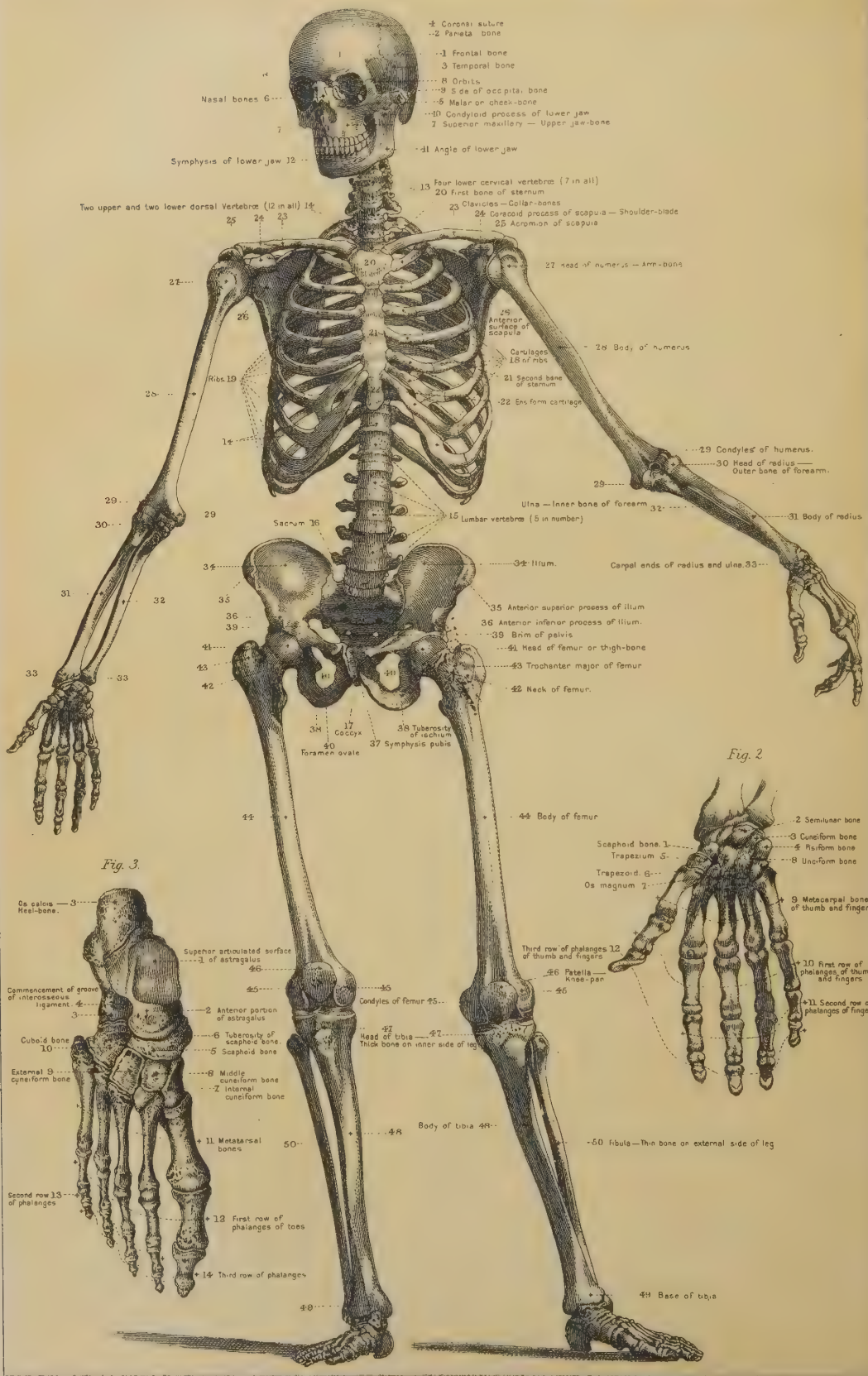
ANASTASIUS I., Emperor of the East, succeeded Zeno, A.D. 491, at the age of sixty. Of an obscure family, he owed his elevation to Ariadne, widow of Zeno, whom he married. He distinguished himself by his moderation towards different Christian sects, whose quarrels at that time disturbed the peace and safety of the Byzantine Empire. He was defeated by the Persians and by the Goths, against whose incursions he built a wall, and was anathematized by the pope for his support of the Eutychians. He died A.D. 518, after a reign of twenty-seven years.

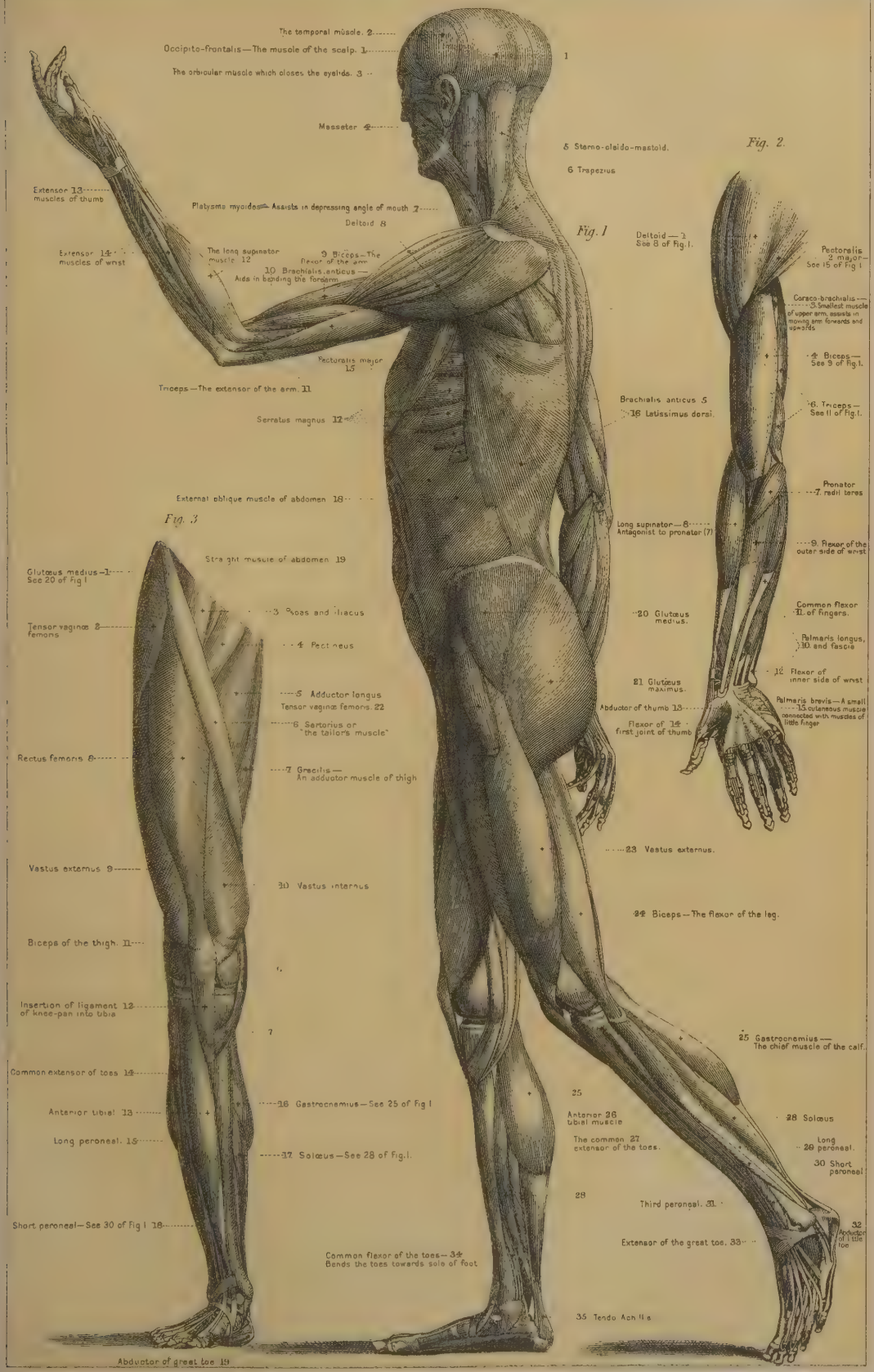
ANASTATIC PRINTING, derived from a Greek adjective signifying *resuscitation*; a process by which the perfect facsimile of a page of type or an engraving, old or new, can be reproduced and printed in the manner of a lithograph or page of letterpress. The print or page to be transferred is dipped in diluted nitric acid, and while retaining a portion of the moisture, is laid face downwards on a polished zinc plate and passed through a roller-press. The zinc is immediately corroded by the acid contained in the paper, excepting on those parts occupied by the ink of the type or engraving. The ink while rejecting the acid is loosened by it, and deposits a thin film on the zinc, thus protecting it from the action of the acid. The result is, that those parts are left slightly raised in relief, and the plate being then washed with a weak solution of gum, and otherwise treated like a lithograph, the raised parts being greasy, readily receive ink from the roller, and give off a facsimile impression of the original. See LITHOGRAPHY.

ANATHEMA, a word used in a form of excommunication from the church. It is properly a Greek word, and originally it was applied to an object set apart and devoted to a deity, such as a gift hung up in a temple (being derived from the Greek *anatithēmi*, I lay up); but it gradually came to be used for something devoted to evil, something accursed; and latterly to pronounce an anathema, to *anathematize*, became much the same as to curse. *Anathema* occurs repeatedly in New Testament Greek, in the English version being generally rendered 'accursed', but once the original word is retained (1 Cor. xvi. 22) along with *maranatha*, the latter serving apparently to intensify the curse, though it is properly a Syriac expression signifying 'the Lord will come'. The Greek and Roman Catholic Churches both make use of the anathema. In the latter it can be pronounced only by a pope, council, or some of the superior clergy. The subject of the anathema is thus declared an outcast from the church. When councils declare any belief heretical the declaration is couched in the following form: *Si quis dixerit*, &c., *anathema sit*, 'If any one says (so and so) let him be anathema'. The anathema was thus pronounced by the Vatican council against opponents of the doctrine of papal infallibility. In the middle ages the anathema was freely used. See EXCOMMUNICATION.

ANATOLIA, a name for Asia Minor.

ANATOMY (Greek, 'a cutting up') means strictly the art of dissection. It implies generally the science which treats of the *structure* of living beings, it being reserved for the related science of Physiology to study the *functions* of living beings. The term 'living beings' includes both plants and animals. So there is *vegetable anatomy* or *phytotomy*, having to do with the structure of plants; and the *anatomy of animals* or *zootomy*, a special branch of which is *human anatomy* or *anthropotomy*. *Comparative anatomy* discusses the resemblances and differences between the structure of the bodies of various animals and man, a comparison which is a great aid to exact knowledge; whilst *special anatomy* is concerned only with the structure of single types. By *minute anatomy*, *general anatomy*, or *histology*, is meant the study of the elements of which a tissue or organ is built up, a study conducted by means of highly magnifying microscopes, and aided by the use of chemical reagents and dyeing materials which, by attacking the various elements of a tissue in different ways, render them more easily distinguished from one another. The tracing of the development of form and structure from the earliest stage of an organism to its most complete form belongs to *developmental* or *embryotical anatomy*. *Morbid* or *pathological anatomy* treats of the changes of structure due to or accompanying disease or congenital malformations; and *teleological* or *physiological anatomy* treats of structure and structural change with reference to the functions of the parts. We also speak of *regional anatomy*, or the anatomy dealing with the surgical regions of the body. The chief method of obtaining anatomical knowledge is by dissection. The dissection of the human body was but little practised by the ancients. The old Egyptians held it in great abhorrence, and even pursued with stones those men who, in embalming the dead, were obliged to cut open their bodies. The Greeks were prevented by the principles of their religion from studying anatomy, since these required them to bury the bodies of the deceased as soon as possible. Even in the time of Hippocrates anatomical knowledge was imperfect, and was probably derived from the dissection of animals; the skeleton, however, was better known. Neither Hippocrates nor his disciples and followers, such as Polybus, Syennesis of Cyprus, and Diogenes of Apollonia, had any really definite and correct knowledge of the circulatory and nervous systems; and, moreover, the later Hippocratic writings contain much that is purely fanciful and speculative in addition to the statement of known facts. With Aristotle comparative anatomy took a great step in advance. That philosopher reached much more accurate conceptions as to the blood-vessels and the heart than his predecessors, and on many other points too his knowledge was substantially correct, but in regard to the nervous system his ideas were very confused. When, in later times, under the Ptolemies, Alexandria in Egypt became the seat of the arts and sciences, anatomy was also brought to a high degree of perfection by Herophilus of Chalcedon, 300 B.C., and by Erasistratus of Chios. The work of these men is, however, known to us only through the references and quotations of later writers. According to the testimony of Celsus, the former obtained permission to open living criminals. He enriched anatomy with many important discoveries respecting the brain, the functions of the nerves, the blood-vessels of the mesentery which go to the liver, &c. Erasistratus determined many facts in the construction of the brain with greater distinctness, and, among other improvements, gave to the valves in the *vena cava* the names which are yet used. In the work on medicine by Celsus (53 B.C.–7 A.D.) which has come down to us there are many anatomical references; and from these we may gather that that celebrated physician, in addition to a very accurate and extensive knowledge of osteology, had a good acquaintance with the windpipe, œsophagus, lungs, heart, stomach, liver, kidneys, uterus, and other parts. In


4 Coronal suture
2 Parieta bone
1 Frontal bone
3 Temporal bone
8 Orbits
9 Side of occipital bone
5 Malar or cheek-bone
10 Condyloid process of lower jaw
7 Superior maxillary — Upper jaw-bone
Nasal bones 6
11 Angle of lower jaw
Symphysis of lower jaw 12
13 Four lower cervical vertebræ (7 in all)
20 First bone of sternum
Two upper and two lower dorsal Vertebræ (12 in all) 14
23 Clavicles — Collar-bones
24 Coracoid process of scapula — Shoulder-blade
25 Acromion of scapula
27 Head of humerus — Arm-bone
Anterior surface of scapula
28 Body of humerus
Cartilages 18 of ribs
Ribs 19
21 Second bone of sternum
22 Ensiform cartilage
29 Condyles of humerus.
30 Head of radius — Outer bone of forearm.
Ulna — Inner bone of forearm
31 Body of radius
15 Lumbar vertebræ (5 in number)
Sacrum 16
34 Ilium.
Carpal ends of radius and ulna 33
35 Anterior superior process of ilium
36 Anterior inferior process of ilium.
39 Brim of pelvis
41 Head of femur or thigh-bone
43 Trochanter major of femur
42 Neck of femur.
17 Coccyx
38 Tuberosity of ischium
40 Foramen ovale
37 Symphysis pubis
44 Body of femur
Fig. 2
2 Semilunar bone
3 Cuneiform bone
4 Pisiform bone
8 Uniform bone
Scaphoid bone 1
Trapezium 5
Trapezoid 6
Os magnum 7
9 Metacarpal bones of thumb and fingers
Third row of phalanges 12 of thumb and fingers
10 First row of phalanges of thumb and fingers
11 Second row of phalanges of fingers.
Fig. 3.
Os calcis — 3 Heel-bone.
Superior articulated surface 1 of astragalus
46 Patella — Knee-pan
45 Condyles of femur 45
Commencement of groove of interosseous ligament 4
2 Anterior portion of astragalus
47 Head of tibia — Thick bone on inner side of leg
Cuboid bone 10
6 Tuberosity of scaphoid bone
5 Scaphoid bone
External 9 cuneiform bone
8 Middle cuneiform bone
7 Internal cuneiform bone
48 Body of tibia
50 Fibula — Thin bone on external side of leg
11 Metatarsal bones
Second row 13 of phalanges
12 First row of phalanges of toes
14 Third row of phalanges
49 Base of tibia


The temporal muscle. 2
Occipito-frontalis—The muscle of the scalp. 1
The orbicular muscle which closes the eyelids. 3
1
Masseter 4
5 Sterno-cleido-mastoid.
6 Trapezius
Extensor 13 muscles of thumb
Platysma myoides—Assists in depressing angle of mouth 7
Deltoid 8
Fig. 1
Deltoid—1. See 8 of Fig. I.
Extensor 14 muscles of wrist
The long supinator muscle 12
9 Biceps—The flexor of the arm
10 Brachialis anticus—Aids in bending the forearm
Pectoralis major 13
Triceps—The extensor of the arm. 11
Serratus magnus 12
Brachialis anticus 5
16 Latissimus dorsi.
External oblique muscle of abdomen 18
Fig. 3
Straight muscle of abdomen 19
Glutæus medius—1 See 20 of Fig I
3 Psoas and Iliacus
Tensor vaginæ femoris 2
4 Pectineus
5 Adductor longus
Tensor vaginæ femoris. 22
6 Sartorius or "the tailor's muscle"
Rectus femoris 8
7 Gracilis—An adductor muscle of thigh
20 Glutæus medius.
21 Glutæus maximus.
Abductor of thumb 13
Flexor of 14 first joint of thumb
Vastus externus 9
23 Vastus externus.
30 Vastus internus
24 Biceps—The flexor of the leg.
Biceps of the thigh. 11
Insertion of ligament 12 of knee-pan into tibia
25 Gastrocnemius—The chief muscle of the calf.
Common extensor of toes 14
Anterior tibial 13
16 Gastrocnemius—See 25 of Fig I
Long peroneal. 15
17 Soleus—See 28 of Fig. I.
Short peroneal—See 30 of Fig I 16
Common flexor of the toes—34 Bends the toes towards sole of foot
Antarior 26 tibial muscle
28 Soleus
The common 27 extensor of the toes.
Long 29 peroneal.
30 Short peroneal
Third peroneal. 31
32 Adductor of little toe
Extensor of the great toe. 33
35 Tendo Achillis
Abductor of great toe 19
Fig. 2.
Deltoid—1. See 8 of Fig. I.
Pectoralis 2 major—See 15 of Fig I
Coraco-brachialis—3 Smallest muscle of upper arm, assists in moving arm forwards and upwards
4 Biceps—See 9 of Fig. I.
6 Triceps—See 11 of Fig. I.
Pronator 7 radii teres
Long supinator—8 Antagonist to pronator (7)
9 Flexor of the outer side of wrist
Common flexor 11 of fingers.
Palmaris longus, 10 and fascia
12 Flexor of inner side of wrist
Palmaris brevis—A small 15 cutaneous muscle connected with muscles of little finger

later times the study of anatomy was again neglected, particularly by the empirics. Galen (A.D. 130–193), educated in Alexandria, collected all the anatomical knowledge of his contemporaries and of earlier physicians, but seems not to have much enriched human anatomy himself, as he was principally occupied with the dissection of animals, and only applied his observations on them to the structure of the human body. His osteology is the most accurate and complete part of his system, and to him we owe the first really complete account of the vertebræ, and their division into cervical, dorsal, and lumbar. In his knowledge of the muscles he was much ahead of those already mentioned, but, of course, not satisfactory from a modern stand-point. In respect of angiology, he proved that the view that the arteries contained air and not blood was erroneous, but beyond that he did not go very far. He accepted the distinction made by earlier anatomists between the nerves of sensation and those of motion; the former he regarded as originating in the brain, the latter as proceeding from the spinal chord. Of the brain and the leading viscera his knowledge was very accurate. The only post-Galenian ancient anatomists worthy of note are Soranus of Ephesus, who lived under Trajan and Hadrian, and Oribasius, born at Pergamus, Galen's birthplace, who was the friend of Julian the Apostate. Of these the former is remembered for his dissection of the female genital organs, whilst the latter has left a good description of the salivary glands. Among the Arabians anatomy was not practised: it was forbidden by their religion. Their physicians, therefore, took their anatomical information merely from the writings of the Greeks, particularly from those of Galen. Thus anatomy was checked in its progress for several centuries. Finally, in the fourteenth century, individuals arose who, not satisfied with the anatomical instruction of the age, ventured to make investigations of their own. The superstitious fear of the dissection of human corpses which had hitherto prevailed appeared to subside by degrees, when a philosophical spirit gave birth to more liberty of thought. Mondino di Luzzi, professor at Bologna, first publicly dissected two corpses in 1315, and soon afterwards published a description of the human body, which for a long time was the common compendium of anatomy, though many errors were contained in it. To him has been traced the first conception of the circulation of the blood. From this time it became customary in all universities to make public dissections once or twice a year. Anatomy, however, made but slow progress, since the dissections were intended only as illustrations of the writings of Galen and the compendium of Mondino. Montagnana alone, professor at Padua in the fifteenth century, could boast of having performed fourteen dissections, which was then a great number. One of the greatest of Mondino's pupils was Alexander Achillini of Bologna (1463–1512), specially distinguished for researches on the brain and the bowels. James Berenger of Carpi flourished about 1520, and in several works gives an excellent general account of human anatomy. In the sixteenth century there were many celebrated anatomists, by whose influence the study of anatomy became more general. Dubois (1478–1555), Fallopio (about 1550), Eustachi (about 1500), Etienne (1503–1564), Vesalius (1514–1564), Varoli (1545), and many others, enriched anatomy with new discoveries. In the seventeenth century there were likewise many famous anatomists, and many discoveries were made; thus Harvey discovered the circulation of the blood, Wirsung the pancreatic duct, Schneider the mucous membrane, Asellius the mode of absorption of the nutritious part of foods into the circulation, Bartoline the lymphatic system; and other notable names are those of Glisson, Wharton, Willis, Malpighi, Steno, Ruysch, Brunner, Tassin, Duverney, Collins, Nieussens, Santorini, and Morgagni. In the eighteenth century Pacchioni, Valsalva, Keil, Lancisi, Haller, Boerhaave, Vicq-d'Azir, the two Hunters, and others, distinguished themselves by their skill in anatomy. The younger Meckel, Sömmering, Loder, Reil, Bichat, Portal, Rosenmüller, Quain, Cooper, Bell, Carus, Häckel, Gegenbaur, Owen, and Huxley, are worthy to be mentioned as renowned anatomists of later times. The use of the microscope in anatomical investigation dates from the latter part of the seventeenth century, but it is only in comparatively recent times that it has led to any very great extension of our knowledge. In this connection some of the chief names are those of Johann Müller, Kiernan, Barry, Goodsir, Virchow, Beale, Schultze, Owen, and Bowman. According to the parts of the body described the different divisions of anatomy receive different names; as, *osteology*, the description of the bones; *myology*, of the muscles; *desmology*, of the ligaments and sinews, &c.; *splanchnology*, of the viscera or bowels, in which are reckoned the lungs, stomach, and intestines, the liver, spleen, kidneys, bladder, pancreas, &c. *Angiology* describes the vessels through which the liquids in the human body are conducted, including the blood-vessels, which are divided into arteries and veins, and the lymphatic vessels, some of which absorb matters from the bowels, while others are distributed through the whole body, picking up juices from the tissues and carrying them back into the blood. *Neurology* describes the system of the nerves and of the brain; *dermology* or *dermatology* of the skin.—Among anatomical labours are particularly to be mentioned the making and preserving of anatomical preparations. Thus the whole system of bones, cleared from all the adherent muscles, tendons, and other parts, is prepared by drying and washing with acids, the latter process giving firmness and whiteness to the bones. The intestines and other soft parts of the body are prepared by putting them into various liquids, such as alcohol, spirits of turpentine, &c. For the preservation of vessels, and in order to show clearly their course and distribution, injections are used. The most usual liquid for this purpose is a mixture of linseed-oil and turpentine with certain metallic compounds, to which is added a suitable colouring substance, such as red for arteries, green or blue for veins, and white for lymphatic vessels. Muscles are usually tanned and covered with a suitable varnish. Our anatomical plates will enable the reader to understand the arrangement of the bones and muscles of the human frame. See also articles SKELETON, MUSCLE, HAND, HEART, SHOULDER, STOMACH, &c.

Until 1832 the law made very insufficient provision for enabling anatomists to obtain a sufficient supply of subjects for dissection. The only act under which such supply could be got down to that date was 9 Geo. IV. cap. xxxi. sec. 4, which empowered a criminal court, when it saw fit, to direct that the body of a person executed for murder should be dissected after execution. The consequence of this deficiency was that the price of bodies for anatomical purposes was so great as to lead people to resort to illegal and nefarious practices in order to get dead bodies to sell to the doctors. Resurrectionists, as they were called, used to dig up newly-buried corpses with this object, and in more than one case it was discovered that murder was systematically practised for the same purpose. (See BURKE AND HARE.) To remedy these evils the law that still regulates the supply of bodies for dissection, 2 and 3 Will. IV.

cap. lxxv., was passed in the year mentioned, and its operation is said to be such as, generally speaking, to meet the wants of anatomical students. This act, after reciting in the preamble the evils that it is intended to counteract, 'empowers the principal secretary of state (the home secretary) and the chief secretary for Ireland to grant a license to practise anatomy to any fellow or member of any college of physicians or surgeons, or to any graduate or licentiate in medicine, or to any person lawfully qualified to practise medicine, or to any professor or teacher of anatomy, medicine, or surgery, or to any student attending any school of anatomy.' The main provision for the supply of subjects for dissection is contained in the seventh clause, which says that executors or others having lawful possession of the body of any deceased person, unless intrusted with the body only for the purpose of interment, may permit such body to undergo anatomical examination, unless, to the knowledge of such executors or others, such person shall have expressed a desire, either in writing during life or verbally in the presence of two or more witnesses during the illness whereof he or she died, that his or her body after death might not undergo such examination, or unless the surviving husband or wife, or any known relative of the deceased person, shall require the body to be interred without such examination. This clause enables anatomists to acquire the bodies of a considerable number of persons who die friendless in almshouses, hospitals, &c. The eighth clause requires that, if any person has duly expressed a desire that his or her body be anatomically examined after death, those having lawful possession of the body after death shall see that this desire is carried out, unless the surviving husband or wife, or the nearest known relative of the deceased, shall require the body to be interred without such examination. Inspectors are appointed to supervise the carrying out of the act. No body may be removed from the place of death until after forty-eight hours after the decease, nor until after twenty-four hours' notice of the intended removal has been given to the inspector of the district, or if there be no inspector to some physician or qualified person, nor until the cause of death has been duly certified. The act does not prohibit *post-mortem* examination directed to be made by any competent legal authority. Offenders against this act are declared guilty of a misdemeanour, and are liable to be imprisoned for a period not exceeding three months, or to a fine not exceeding £50.

ANAXAGORAS, one of the principal Ionic philosophers, born at Clazomenæ, in Ionia, probably about 500 B.C. He is said to have been left a considerable property by his father, but to have renounced it in order to devote his whole attention to the study of nature. At some period of his life he settled at Athens, where he formed an intimacy with Pericles, Euripides, and other eminent men then living in that city. At Athens he is said to have lived thirty years, but by the intrigues of his enemies he was accused of impiety, and in consequence of this accusation was obliged to leave. He thereupon went to Lampsacus, where he is said to have died soon after at the age of seventy-two. Anaxagoras belonged to the atomic school of Ionic philosophers, but differed from other atomists in holding that there was an infinite number of different kinds of elementary atoms, each variety corresponding to a particular substance in nature, such as gold, silver, water, bone, &c. Every unmixed substance, that is, every substance composed of atoms of only one kind (as pure gold, &c.), was called by Aristotle *homoiomeres;* but later writers in speaking of the philosophy of Anaxagoras apply the term *homoiomereiai* (homœomerids) to the homogeneous particles themselves. These atoms, in themselves motionless and originally existing in a state of chaos, were in the beginning put in motion by another equally eternal, immaterial, spiritual, elementary being, which he called *Nous* (Intelligence), and which he was the first to introduce into Greek philosophy. By this motion, gradually effecting with more or less completeness the separation of the dissimilar particles, and the combination of those of the same nature, the world was formed; the earthy bodies sank down, whilst the ether or fire rose and spread in the upper regions. The stars, however, were, according to him, of earthy materials, and the sun a glowing mass, about as large as the Peloponnesus. The Milky Way he thought to be, like the rainbow, the reflection of light. The earth was, according to him, flat; the moon a dark, inhabitable body, receiving its light from the sun; the comets, wandering stars. Archelaus of Athens was the chief of his disciples.

ANAXIMANDER, an Ionic philosopher, son of Praxiades, a disciple of Thales, was born at Miletus in the second year of the 42d Olympiad (611 or 610 B.C.), and died in the second year of the 58th Olympiad (547 or 546 B.C.). The fundamental principle of his philosophy is that the source of all things is an undefined substance infinite in quantity. Modern interpreters of the doctrine are not agreed whether to regard this primary substance as a confused mixture of all substances, or as something different from all definite substances. The firmament, according to him, is composed of heat and cold, the stars of air and fire. The sun occupies the highest place in the heavens, has a circumference twenty-eight times larger than the earth, and resembles a cylinder, from which streams of fire issue. When its opening is obstructed it appears eclipsed. The moon is, according to him, likewise a cylinder, nineteen times larger than the earth; its inclination produces the phases, its entire revolution the eclipses. Thunder and lightning are productions of the wind, compressed within the clouds. The earth has the shape of a cylinder, and is placed in the midst of the universe, where it remains suspended. Besides speculating on the origin of all things Anaximander occupied himself a great deal with mathematics and geography. He is said to have sketched the outlines of lands and seas on a globe, and to have made a celestial globe for the explanation of his system of the universe. He is also credited with the invention of the sun-dial, but perhaps he did no more than introduce it to the Greeks.

ANAXIMENES of Miletus, an Ionic philosopher, perhaps a disciple of Anaximander. He was at any rate later than this philosopher, but we know neither the date of his birth nor of his death. According to him air is the first principle of all things. Like his predecessors he held that matter was eternal. Finite things were formed from the infinite air by compression and rarefaction produced by eternally existent motion; and heat and cold resulted from varying degrees of density of the primal element. He taught that the exterior circumference of the heavens consisted of earth; that the stars were solid bodies, surrounded by fire; that the sun, by whose course alone the seasons are determined, was flat, as well as the earth, which rests upon the air.

ANCELOT, Jacques Arsène Polycarpe François, a French *littérateur*, born at Havre, Jan. 9, 1794; died at Paris, Sept. 8, 1854. He was educated at his native town and at Rouen. In 1819 he began his literary career at Paris with the tragedy of Louis IX., which not only proved a theatrical success, but gained for him a pension of 2000 francs from Louis XVIII., and advancement in the service of the state

in which he had been employed from early youth. These favours were due not so much to the excellence of the piece as to the fact that it was looked upon by the royalists as a counter-success to the republican dramatic success of that period, the Vêpres Siciliennes of Casimir Delavigne. Louis IX. was followed in 1823 by Le Maire du palais, another drama; after which came in succession Fiesque (an adaptation of Schiller's Fiesco), Olga, Elisabeth d'Angleterre, Six mois en Russie (a work partly in prose, partly in verse, written after a visit to Russia, where he had accompanied Marshal Marmont), Marie de Brabant (an epic poem of a tragical cast), and L'Homme du Monde (a novel afterwards dramatized by himself with the aid of Saintine). At the revolution of July, 1830, he lost both his pension and his appointment in the service of the state, in consequence of which he was compelled to write for the support of his family. During the remainder of his life he wrote, either alone or in conjunction with others, about fifty vaudevilles, all of which had some temporary success, but none of any permanent value. In 1838 he produced another tragedy, Maria Padilla, which procured his admission into the French Academy in 1841. His wife, Marguerite Louise Virginie, is also the author of various novels, vaudevilles, and dramas of a more ambitious character.

ANCHISES, son of Capys, and great-grandson of Tros. Venus, captivated by his beauty, appeared to him on Mount Ida (according to some, near the river Simois) in the shape of a Phrygian shepherdess, and bore him Æneas. His son carried him off on his shoulders at the burning of Troy, and made him the companion of his voyage to Italy. He died during the voyage at Drepanum, in Sicily. According to other accounts Jupiter killed Anchises with a thunderbolt, because when excited with wine he betrayed the secret of his intimacy with Venus.

ANCHOR, a strong and heavy instrument of iron, intended to be dropped from a ship into the bottom of the water, to retain her in a convenient station in a harbour, road, or river. It usually consists of a shank, having at one end a ring, to which the cable is fastened, and a cross-piece or stock, and at the other end two arms with blades at the end called flukes. In one form of anchor the stock is not a cross-piece in the sense of lying transversely to the direction of the arms, but lies in the same direction. In the time of Homer large stones were used for anchors; afterwards they are said to have been sometimes of wood, to which a great quantity of lead was fixed. In some places baskets full of stones and sacks filled with sand were employed for the same use. All these were let down by cords into the sea, and by their weight stayed the course of the ship. Among the Greeks of later times anchors were composed of iron. Sometimes there was only one tooth or fluke, but generally there were two. The anchors with two flukes appear from ancient monuments to have been much the same with those used at present, only the transverse piece of wood fastened to the shank (the stock) is wanting in all of them. Every ship had several anchors, one of which, surpassing all the rest in bigness and strength, was peculiarly termed, in Greek, *hiera*, and in Latin *sacra*, and was never used but in extreme danger; whence *sacram ancoram solvere* is proverbially applied to such as are forced to their last refuge. When an anchor of the usual form is let fall from the vessel, it generally strikes the bottom with the crown or curve of the arms, and then falls over on one of the ends of the stock, the arms lying flat on the ground. In this position it cannot bite, so that it has to be *canted* or turned over till the stock lies flat, and the point of one of the flukes (the *bill* or *peak*) rests on the ground. The canting is effected by the vessel pulling at the cable, and the longer the stock and the shorter the arms the less is the force required to perform the operation; for this reason the stock is always made longer than the arms. The anchor will now either drag or penetrate the ground, the readiness with which it does the latter depending on the sharpness of the bill, the angle at which the fluke rests on the ground, and of course the nature of the soil. Formerly the arms used to be rigidly attached to the shank of the anchor; but in 1838 Mr. Porter took out a patent for an anchor of a new construction (the principle was known before, however), in which the arms were movable round a pivot at the end of the shank, the plane of their movement being perpendicular to the direction of the stock. The advantages of this anchor are, that there is almost no possibility of fouling it, that is, of the cable becoming entangled with one of the arms; it cannot lodge on the stock end; it presents no upper fluke to injure the vessel to which it is attached or others in shoal water (since the swivel movement enables the peak of the upper fluke to come close to the shank when the anchor is fixed); it is not so liable to break, is more conveniently stowed on board, &c. This form of anchor as improved by Trotman is now largely used in the merchant service. Another anchor is Rodger's, the chief peculiarity of which is its small flukes, though this does not prevent it from holding the ground well. A well-known anchor is that originally patented by a Frenchman named Martin. In this anchor (which has been considerably improved since it was first introduced) the stock lies in the same direction as the arms, the consequence of which is that when the anchor reaches the ground it inevitably falls flat, with both stock and arms resting on the bottom. The arms are capable of turning in a socket through an angle of 30° in such a manner that when the anchor is lying flat on the ground the flukes of both arms may sink into the ground at an angle of 15°. The weight of the arms and the pull of the vessel together cause them to do this. It must be understood that the flukes are not perpendicular or at right angles to the direction of the arms, but lie in the same direction. Besides holding the ground firmly this anchor has the advantages of being free from liability to foul and being easily stowed. This last advantage particularly recommends it for use in unmasted turret ships. The principle of this anchor is not a new one. Several stockless anchors have been introduced in recent times, and in the British and other navies they are now in quite common use. In these the arms and crown are in a single piece (as in the Martin anchor), the construction being such that the flukes bite by the drag on the cable.

The different anchors carried by a ship are called bower, sheet, stern, and kedge anchors. The bower anchors are so called from their being stowed in the bow. When one bower-anchor is heavier than the other it is called the best-bower and is stowed on the starboard side. The sheet-anchors are stowed in the waist of the ship as far forward as convenient. The stream-anchor is used in a river or sheltered place where a large anchor is not required. The stern-anchor is stowed in the stern, and is used along with a bower-anchor where there is no room for a vessel to swing with the tide. The kedge-anchor is used to warp a ship from place to place; that is, the anchor is carried to a distance in a boat and the ship is then pulled up to it by means of the cable. A large ironclad carries eight anchors, two bower, two sheet, and two kedge anchors, with one stream and one stern anchor. The anchor is said to be *a-peak* when the cable is perpendicular between the hawse and the anchor; it is said to *come home* when it does

not hold the ship. To *shoe* an anchor is to fix boards upon the flukes so that it may hold better in soft bottom. *Riding at anchor* is the state of the vessel when moored by the anchor or anchors. *Dropping* or *casting anchor* is letting it down into the sea. *Weighing anchor* is raising it from the bottom. A *mooring anchor* is a stationary anchor in a harbour or roadstead, having a buoy attached to it by a cable, enabling a ship to moor simply by fastening itself to a ring-bolt on the buoy. These anchors must not project above the bottom, lest a ship receive injury by grounding on them. Mooring anchors are of various kinds, and in some cases a heavy block of stone or of cast-iron serves as such. One of the most powerful mooring anchors yet invented consists of a wrought-iron shaft with a pointed screw end, and near the lower end a cast-iron screw flange, 3½ feet in diameter. The anchor is screwed down into solid ground, and when this is done such an anchor, weighing no more than 14 lbs., has much more holding power than a cast-iron anchor weighing 7 tons. The making of anchors used to be a most formidable piece of smith-work, but was much facilitated by the invention of the steam-hammer. The shank of a large anchor, nearly 20 feet long and 10 or 12 inches thick, requires to be built up of a number of bars of iron, which have to be welded together; and the forging of such a mass used to have something of the picturesque about it when the anchor-smiths were grouped round the glowing metal keeping time with the blows of their ponderous sledge-hammers. Crucible cast steel is now to some extent used for anchors. The anchor, as everybody knows, is the symbol of hope.

ANCHORAGE, a place suitable for ships anchoring. A good anchorage should have a soft bottom and a depth of from 10 to 20 fathoms. When it is deeper than this the cable bears too nearly perpendicular and is apt to drag up the anchor. The length of cable payed out by a ship anchoring in ordinary weather is about three times the depth of the water. Anchorage also means dues paid by a vessel anchoring. As a rule a ship sheltering from stress of weather and not discharging cargo at the place where it anchors is not required to pay dues. Shore-dues are payable whether a ship anchors or not.

ANCHORITES, or ANCHORETS (Greek, *anachōrētai*, persons who have withdrawn themselves from the world), hermits, or religious devotees who pass a solitary life apart from their fellows; especially, in the early history of Christianity, a celebrated class of religious persons who generally passed their lives in cells, from which they never removed. In all ages and in all countries retirement from the world has been considered as facilitating the attainment of a virtuous life, as adding strength to strong characters, and enabling the mind to follow out great ideas without interruption. The ancient prophets often prepared themselves in solitude for their tasks; the Pythagoreans, Stoics, Cynics, and Platonists recommend the self-denial and the quiet happiness of the solitary sage. In many parts of the East, where a sombre religion throws over life a melancholy shade, it has been thought, from time immemorial, a religious act to quit for ever the busy world and even to add bodily pain to the melancholy of solitude. This spirit, which still prevails in the East, passed over, with many other oriental ideas, doctrines, and customs, to the early Christians, especially those in the Byzantine Empire, and the state of the world in the beginning of the Christian era was peculiarly fitted to favour its growth. The continual prevalence of bloody wars and civil commotions at this period must have made retirement and religious meditation agreeable to men of quiet and contemplative minds. Accordingly we find in the first centuries of our era very eminent and virtuous men living the life of anchorites. This spirit, however, as might have been expected, soon led to fanatical excesses. The horrid penances of the East were introduced among Christian hermits; and we find, at the close of the fourth century, Simeon Stylites passing thirty years on the top of a column, seldom descending from it, and finally dying there. Nor was he the only instance of such extraordinary self-torture. Though we must needs pity such unhappy delusion, such a moral insanity, we cannot help acknowledging the strong power of will exhibited in this and many other instances of a similar kind. For a time the spirit of retirement and self-torment raged like an epidemic among the early Christians in the East. In Egypt and Syria, where Christianity became blended with the Grecian philosophy and strongly tinged with the peculiar notions of the East, the anchorites were most numerous; and from those who lived in cells in the vicinity of a church the early monastic institutions arose. (See the article MONASTERY.) The anchorites had their habitations, in many instances, entirely separated from the abodes of other men, sometimes in the depth of wildernesses, in dens or caverns; at other times, several of these individuals fixed their habitations in the vicinity of each other, when their cells were called by the collective (Greek) name of *laura*; but they always lived personally separate. Thus the laura was distinguished from the *cœnobium* or convent, where the monks lived in society on a common stock; and the anchorite differed from a hermit, although his abode was frequently called a *hermitage*, inasmuch as the latter ranged at liberty, while the former rarely, and in many instances never, quitted his cell. But a convent was sometimes surrounded by a laura, to which the more devout or the more idle of the monks would ultimately retire. Early in the seventh century the councils began to lay down rules for the order of anchorites. The Trullan canons say: 'Those who affect to be anchorites shall first, for three years, be confined to a cell in a monastery; and if after this they profess that they persist, let them be examined by the bishop or abbot, let them live one year at large, and if they still approve of their first choice, let them be confined to their cell and not be permitted to go out of it but by the consent and after the benediction of the bishop in case of great necessity.' Frequently at this period the monks of various abbeys would select from among them a brother, who was thought to be most exemplary in his profession, and devote him to entire seclusion, as an honour, and to give him the greater opportunity of indulging his religious contemplations. In Fosbrook's work on Monachism the ceremony by which an anchorite was consecrated to seclusion from the world is described at length. The cells in which the anchorites lived were, according to some rules, only 12 feet square, of stone, with three windows. The door was locked upon the anchorite, and often walled up. The cell which was occupied by St. Dunstan at Glastonbury was, according to his early biographer, the monk Osbern, not more than 5 feet long, 2½ feet broad, and barely the height of a man. In such a narrow abode as this the recluse would pass his time in ingenious self-torture, in eternal silence, heavy chains, severe flagellations, singing psalms in cold water during winter nights, &c. This species of devotion, originally introduced, as we have said, from the East, found many more adherents in the south of Europe than in the north. With the revival of science and the consequent diffusion of more liberal views, the strictest kind of anchorites have almost entirely disappeared. Few men now retire to any seclusion more strict than that of a convent. But some persons, who pass

a solitary life in certain localities, even yet call themselves anchorites; and in India the practice still prevails in all its severity.

ANCHOVY (see plate at article ICHTHYOLOGY), a small fish of the Herring family (Clupeidæ), the type of the genus *Engraulis*. The Common Anchovy (*E. encrasicholus*) is about 5 or 6 inches in length, its colour being a bluish-green on the back, with silvery belly and sides. It differs from the other herrings in having the æthmoid and nasal bones prolonged to a point, beneath which their very small intermaxillaries are attached; their maxillaries are very straight and long; the mouth and throat are very wide; both jaws being well furnished with teeth, and the gills more separated than in other species. The anchovy is found in the greatest abundance in the Mediterranean, and on the coasts of France, England, and Holland, whither they come in immense shoals, like the larger herrings, for the purpose of spawning. Nets of 40 fathoms long and from 25 to 30 feet wide are employed to take them; these nets differ in nothing from those commonly used, except in having very small meshes. The anchovy fishery in the Mediterranean is begun in the spring and continues until the commencement of summer, and is especially carried on in dark nights by the aid of fires. The fishermen provide themselves with floats, upon which a fire of pine-knots is made, and these are placed at different distances over a very considerable extent of sea. The anchovies approach these lights, and collect near them in vast multitudes, when the fishermen silently surround them with their nets, extinguish the fire, and begin to beat upon the water. The frightened fish immediately endeavour to make their escape, and rushing against the net are caught by the meshes, which, passing over their gills, neither allow them to advance nor retreat. The fishermen, as soon as the net appears sufficiently full, raise it and remove the fish, and go to repeat their operations at the next light. The Dutch on their coasts often make use of a sort of funnel-shaped trap of reeds, with a net attached to the bottom. This is fastened to a stake at low water, and at every change of tide is visited for the purpose of removing the anchovies which it contains. Nearly all the anchovies caught are immediately salted, because otherwise they spoil with great rapidity. The scales separate very readily from the body-surface, a fact which has given origin to the popular notion that these fishes are destitute of scales. The heads of the anchovies must be taken off in preserving them, on account of the bitterness—a quality which has obtained for this species the name of *encrasicholus*, from a strange idea, prevalent in ancient times, that the gall-bladder was in the head. The intestines are then removed, and the fishes, after being washed, are packed in barrels like ordinary herrings with layers of salt and fish alternately. Anchovies are eaten dressed in a great variety of modes. Salted anchovies ought to be fresh, white above and reddish below, and free from taint. A very favourite mode of using them is in the form of anchovy-toast, made by spreading the flesh of the pickled anchovy over bread toasted brown.

ANCHOVY-PEAR (*Grias cauliflora*), a tree belonging to the natural order Myrtaceæ, inhabiting the moist districts of Jamaica and others of the West Indian Islands. It grows to the height of 50 feet, and has oblong leaves 2 or 3 feet long, and large white flowers, carried on short many-flowered peduncles. It bears a fruit somewhat bigger than a hen's egg, which is pickled and eaten like the mango, and strongly resembles it in taste.

ANCHUSA. See ALKANET.

ANCHYLOSIS. See ANKYLOSIS.

ANCILLON JEAN PIERRE FRÉDÉRIC, an author and statesman, was born at Berlin in 1766 or 1767, and died there in 1837. He was descended from a French Protestant minister, who had taken refuge in Prussia in consequence of the revocation of the Edict of Nantes. His father was a pastor of the French Reformed Church of Berlin, and intended that his son should also enter the church. Through the influence of Prince Henry, who was attracted by his preaching, he was appointed, in 1792, professor of history in the Military Academy of Berlin, and in the same year royal historiographer. In 1803 he published his Tableau des Révolutions du Système Politique de l'Europe depuis le 15me Siècle. In 1806 he was charged by Frederick William III. with the education of the crown-prince, and in 1814 accompanied his pupil to Paris. On his return he was appointed councillor of public instruction, and in 1831 minister of foreign affairs, always exerting his great influence in the interests of peace and moderation. Equally familiar with philosophy, history, and politics, Ancillon is the author of several treatises of merit (some in French, some in German), in which he exhibits an enlightened eclecticism, avoiding alike prejudice and enthusiasm. Among these may be noted his Essais Philosophiques, ou Nouveaux Mélanges de Littérature et de Philosophie; Ueber Glauben und Wissen in der Philosophie; Ueber den Geist der Staatsverfassungen und dessen Einfluss auf die Gesetzgebung; Zur Vermittelung der Extreme in den Meinungen; Pensées sur l'Homme.

ANCONA, a department (*Compartimento territoriale*) of Italy, comprising the four provinces of Ascoli, Macerata, Ancona, and Pesaro ed Urbino, and lying between the Adriatic and the Apennines on the east and west, and Romagna and the Abruzzi on the north and south; area, 3751 square miles. It was formerly a separate division of Central Italy, bearing the title in full of the Marches of Ancona, and the department is still officially styled La Marca. The marches or marquisate originated under the Lombards, who, after the conquest of these regions about the end of the sixth century, appointed a marquis as governor. During the disputes that prevailed between the popes and emperors in the time of the Hohenstaufen, most of the towns made themselves independent or sought the protection of the popes, to whom they paid tribute. The popes thus acquired a virtual supremacy in the land, which was at last formally conceded to them by the Emperor Rudolf of Hapsburg in a treaty concluded with Gregory X. in 1274. From this date the marquises of Ancona were papal governors. In 1808 the marches were annexed by Napoleon to the Kingdom of Italy, but in 1815 returned to the popes, and they remained papal territory till they were incorporated with the new Kingdom of Italy in 1861. Pop. of department in 1901, 1,064,749.

ANCONA, a province of the Kingdom of Italy, lying between the province of Pesaro ed Urbino on the north, Macerata on the south, and the Apennines and Adriatic on the west and east; area, 740 square miles. It is watered by the rivers Cesano, Esino, and Musone, and produces grain, wine, olives, silk, and southern fruits. The minerals are not yet worked to any great extent, but they include chalk, sulphur, and petroleum. Pop. in 1901, 302,460.

ANCONA, a seaport of Italy, capital of the province of the same name, situated on the Adriatic, between the promontories of Monte Ciriaco and Monte Conero or Guasco, 130 miles north-east of Rome. The harbour works were begun by Trajan, who built the celebrated ancient mole or quay, and were enlarged by Clement XII., who made Ancona a free port in 1732. A triumphal arch of white marble, which is still standing and is much admired,

was erected by the Roman senate on the ancient mole in honour of Trajan. The new quay, which is a continuation of the old, was built by Clement XII., who erected on it another triumphal arch but of far inferior design. The quays are together about 2000 feet long, and the harbour is further protected by a breakwater of 2100 feet in length, and is defended by several forts. The trade is principally with the Black Sea ports, and with Trieste, Venice, Leghorn, Alexandria, and Marseilles. The P. & O. Company's steamers, those of the Austrian Lloyd's and others call here. The principal articles of import are grain, tobacco, and colonial wares; and the principal exports lamb and goat skins, walnut-wood, maize, almonds, wax, silk, and tartar. The principal manufacturing industries are silk, cordage, leather, tobacco, soap, paper, white-lead, hats, sugar. Ancona is very indifferently built, but has a number of remarkable edifices; among others, the cathedral, on the site of a temple of Venus, some columns belonging to which are still standing in the modern structure, an imposing exchange of a Moorish aspect, and a government palace. Its principal monuments are a statue of Clement XII. and one of Count Cavour of colossal size, the latter standing in a piazza named after the count. The population includes a considerable number of Jews and Greeks.

Ancona is an ancient city, having been founded about four centuries before Christ by a body of Dorian Greeks from Syracuse, who left that city in order to escape the tyranny of Dionysius the Elder. Its name is Greek, and signifies 'elbow,' and is due to the shape of the promontory on which it stands. It fell into the hands of the Romans in the first half of the third century B.C., and was afterwards made a Roman colony. In the middle ages it was ravaged successively by Goths, Lombards, and Saracens. Before 1000 A.D. it came into the possession of the marquises of Tuscany as capital of the March of Ancona, and in 1115 passed, by bequest of the Countess Matilda, the last of that Tuscan line, to the popes. Under the Hohenstaufen it declared itself a free city, and managed to maintain its freedom till, in 1532, it was taken by the general of Clement VII. In 1797 it was seized by the French, and in 1799 was taken by the Russians and Austrians after a memorable siege. After again changing masters several times it was restored to the pope in 1815. The Austrians held it from 1849 to 1859, when they evacuated it after the battle of Magenta. In 1861 it was incorporated in the Kingdom of Italy. Pop. (1901), 56,825.

ANCOURT, Florent Carton d'. See Dancourt.

ANCRE, Marshal and Marquis d', properly Concino Concini, a favourite of Marie de Médicis. He was a native of Florence, and on the marriage of Marie de Médicis to Henri IV. in 1600 came in her suite to France. By marrying a favourite of the queen, and by the versatility of his own talents, he obtained rapid promotion, more especially after the assassination of the king (1610), to which he is said, though on insufficient grounds, to have been privy. He became successively Governor of Normandy, Marshal of France, without having ever drawn his sword, and last of all, though a foreigner ignorant of the laws, prime-minister. His pride now knew no bounds, and he even tried to control the movements of the young king, Louis XIII., after he had been declared of full age. When the moment of disgrace arrived he found himself without a friend; and on showing some signs of resistance to the execution of an order for his apprehension, was shot dead on the bridge of the Louvre in 1617. His body, which had been deposited in a church, was disinterred by the populace, torn to pieces, and then burned. His wife, shortly after, accused of treason and witchcraft, was condemned to be burned as a witch, and suffered accordingly.

ANCUS MARCIUS, according to the traditionary history of Rome the fourth king of that city, succeeded Tullus Hostilius, 638, and died 614 B.C. He was the son of Numa's daughter, and sought to imitate his grandfather by reviving the neglected observances of religion. He inscribed the laws respecting religious ceremonies on tables set up in the market-place. His peaceful pursuits were disturbed by the Latins, whom he subdued, causing them to be brought to Rome, where he assigned them the Aventine to dwell upon. These conquered Latins, according to Niebuhr, formed the original *plebs*. He fortified the Janiculum against Etruria, connecting it with the city by the wooden bridge across the Tiber, known as the Sublician; dug the ditch of the Quirites; constructed the harbour of Ostia; and built the first Roman prison of which there is any record. How far these acts are historical cannot be determined.

ANDA, a genus of plants of the natural order Euphorbiaceæ. The *Anda Brasiliensis* is a tree inhabiting Brazil, the wood of which is spongy and light, the flower yellow and large, and the fruit a gray nut, which incloses two kernels, of the taste of chestnuts, in a double rind. The fruit is strongly purgative, and is used by the Brazilians as a remedy in cases of indigestion, jaundice, and other diseases. Oil is pressed from these kernels, with which the natives anoint their limbs. It is said to be a good drying oil and excellent for painting. The rinds of the fruit, thrown into ponds, kill the fish.

ANDALUSIA (Spanish, *Andalucia*), a district in the south of Spain, celebrated for its fertility and picturesque beauty; bounded on the north by Estremadura and New Castile, on the east by Murcia, on the south by the Mediterranean Sea, and on the west by Portugal and the Atlantic. The length from east to west is about 310 miles, the average breadth about 120, and the area about 33,650 square miles. It comprehends part of the Roman province of Baetica, the ancient Moorish kingdoms of Cordova, Sevilla, Granada, and Jaen, and the modern provinces of Seville, Huelva, Cadiz, Jaen, Cordova, Granada, Almeria, and Malaga. It is of very uneven surface, being traversed throughout its whole extent by ranges of mountains. The Sierra Morena runs along its north border, and in the south-east rise the mountains of Granada and Ronda, including numerous sierras, and among them those of the famous Sierra Nevada, which run east to the mouth of the Guadalquivir. Many summits of the latter ranges are covered with perpetual snow; the Mulahacen rising 11,678 feet, and the Picacho de Veleta 11,378 feet above the sea. All the mountains abound with mineral wealth, yielding chiefly copper, cinnabar, and lead, as well as some silver, copper, and coal. Several mines have been opened recently by English companies, especially in the province of Huelva in the west, where the Tharsis and Rio Tinto copper mines are situated. The principal river of Andalusia is the Guadalquivir, which rises in the east part of the province of Jaen, near Carzola, and thence flows W.S.W., and below Seville S.S.W., entering the sea at San Lucar. Its principal affluents are the Guadalimar, Guadiato, and Xenil; and the whole basin covers an area of more than half Andalusia. The rivers south of the Sierra Nevada are quite insignificant. The basin of the upper Guadalquivir lies at an elevation of from 500 to 1500 feet, and consists mainly of saline wastes and other sterile tracts. The lower basin presents sharp contrasts, round Cordova and Seville luxuriant gardens, on the Xenil a desert without a drop of water, on the left bank of the lower Guadal-

quivir the extensive marshy district of Marisma, and stretching from the mouth of the Guadalquivir to that of the Rio Tinto a sandy depression (Arenas Gordas) partially clothed with pine-woods. The vegetation is of the character peculiar to the extreme south of Europe and the north of Africa; the vine, mastic, myrtle, olive, palm, banana, carob, &c., grow abundantly in the valley of the Guadalquivir, which are replaced south of the Sierra Nevada by saffron, cotton, and the sugar-cane. Wheat, maize, barley, many varieties of fruit, and different kinds of grapes, grow here almost spontaneously; besides which, honey, silk, and cochineal form important articles of culture; but the arts of husbandry are in the most backward state. A large portion of the soil is in pasture. The horses are the best breed in the Peninsula, partaking very much of the Arabian character; the bulls of Andalusia are sought for bull-fighting over all Spain; sheep are reared in vast numbers, and bear an abundance of good, but not fine, wool; and the hogs reared on the acorns of the mountain forests furnish hams unsurpassed in any part of Europe. Game, including deer, hares, rabbits, partridges, plovers, and bustards, is abundant. The chief manufactures of this extensive tract, which depends almost exclusively on the soil for its wealth, are woollens, silk, and leather, and are by no means extensive. The Andalusians are descended in part from the Moors, of whom they still preserve decided characteristics. The dress, both of males and females, is picturesque but gaudy. Education is in a low state. The name Andalusia is commonly taken to have been originally Vandalusia, that is, land of the Vandals. The population was in 1897, 3,450,209.

ANDAMANS, a chain of islands on the east side of the Bay of Bengal. They consist of four principal islands, called the North, Middle, South, and Little Andamans, and a number of islets. Middle Andaman, the largest, is about 50 miles long, and 15 or 16 miles broad. North and South Andaman are each about 44 miles long, and the former has near its east coast a mountain called Saddle Peak, about 2400 feet high. The whole chain is volcanic. The last recorded eruption took place in 1792, from a volcano on Barren Island, to the east of the Middle Andaman. The vegetation on the islands is very luxuriant—so much so as to render parts almost impenetrable. The aborigines are about 10,000 in number, and mostly in a state of nature, living almost naked, in the rudest habitations. They are small (generally much less than 5 feet), well-formed, and active, skilful in the use of the bow and in the management of their canoes, and excellent swimmers and divers. They remove the hair from every part of their body. These islands have been used since 1858 as a penal settlement by the British government of India, the settlement being at Port Blair, on South Andaman. Here cultivation has been introduced, rice, coffee, nutmegs, &c., being grown, while the jungle has been cleared off over the neighbouring hills, which now afford pasturage for numerous cattle. A good deal of thoroughly cleared land has been given over to ticket-of-leave men to cultivate. The coffee produced is very well-flavoured, fruits thrive excellently, and the pine-apples of Port Blair have already a good reputation in India. Edible bird's nests are found in large numbers. The natives in the vicinity of the settlement have been taken under the protection of the government, and have become to some extent civilized. The climate is moist, but fairly healthy. Area, 2700 sq. miles. Pop. of Port Blair settlement (1901), 24,499; nearly 12,000 being convicts.

ANDANTE (literally 'walking, at a walking pace'), in music, denotes a time somewhat slow, between *adagio* and *allegro*, and a performance distinct and exact, gentle and soothing. *Andantino* indicates a time a little quicker than *andante*.

ANDELYS, Les, two towns in France, called respectively Le Grand and Le Petit Andely, distant about a mile from each other, in the department of Eure, on the right bank of the Seine, 19 miles south-east of Rouen. Grand Andely was formerly fortified, and part of its defences still exists. Its houses are ill-built, and its streets narrow; but its church is one of the finest in the department. Petit Andely, which lies nearest the Seine, owes its origin to Richard Cœur de Lion, who, in 1195, built here, on his return from Palestine, the Château Gaillard, in its time one of the strongest fortresses in France. In it David II., king of Scotland, found an asylum in 1334. This interesting building is now wholly a ruin, having for a considerable time been used as a quarry. Les Andelys have manufactures of cloth, leather, &c. Here Poussin was born. Pop. (1901), 4539.

ANDENNE, a town in Belgium, in the province of Namur, on the right bank of the Meuse, and 12 miles east by north of the town of Namur. The great staples are delft-ware, porcelain, and tobacco-pipes, and it has also manufactures of paper and fire-proof bricks. In the neighbourhood are beds of pipe-clay, quarries of marble, and mines of lead, zinc, and a kind of coarse coal called *terrehouille*. Considerable quantities of pipe-clay are exported to Holland. The railway from Namur to Liége passes near Andenne. Pop. (1900), 7711.

ANDERAB, or Inderab, a town in Afghanistan, on the north slope of the Hindu Kush, 65 miles south of Kunduz, and about 95 miles north by east of Cabul. It lies at the junction of the rivers Anderab and Kiasan, at the foot of a hill, and is surrounded by fine gardens, fruit-trees, and vineyards. The road that leads to the easternmost pass over the Hindu Kush passes through it, and it has thus a large transit trade.

ANDERNACH, a town of Rhenish Prussia, on the left bank of the Rhine, 10 miles north-west of Coblentz. Its strong walls and massy gates (the Rhine Gate is said to belong to the time of the Merovingians) give it an air of antiquity, but it has narrow dirty streets, and does not possess any edifice particularly deserving of notice except the church of St. Genoveva, built in the thirteenth century, and the watch-tower. Andernach has manufactures of ultramarine, cigars, soap, and perfumes, and has long been famous for its millstones and its *trass*, or cement. Pop. (1895), 6853; (1900), 7889.

ANDERSEN, Hans Christian, a Danish novelist, poet, and writer of fairy tales, was born at Odense, 2nd April, 1805. His father, a poor shoemaker, had acquired some literary tastes, and though he died when his son was quite young he seems to have given his mind the earliest bent to the studies which determined his future career. Hans learned to read and write in a charity school, and eagerly availed himself of these elements of instruction for further improvement. His reading consisted of national ballads, poetry, and plays, many of which he learned to repeat. He wrote juvenile plays, overcharged with horrors and couched in an extravagant poetical diction, and was deeply mortified when they were laughed at; and he acted plays which he had either read or written in a marionette theatre in which he was his own manager. He was put to work in a manufactory, and amused the workmen with singing—an accomplishment in which he excelled; but their habits and his were uncongenial to each other, and he returned home to his favourite pursuits. His mother purposed to make him a tailor, but his heart was set on the theatre; and in autumn, 1819,

he went to Copenhagen, and failing to procure employment of the kind he wished worked for a short time as a joiner. Getting disheartened with this work he applied to Professor Siboni of the conservatory, who, after hearing his voice, undertook to educate him as a singer for the stage; but after six months his voice broke, and his patron recommended him to return home and learn a trade. Rejecting this unpalatable advice, he applied to the poet Guldberg, who obtained him a subordinate employment in a theatre. Here he struggled on for a year or two, prosecuting his studies amid all difficulties, till Councillor Collin, who had become director of the theatre, perceiving his abilities, procured for him free entry into a government school at Slagelse. Meisling, the rector of this school, was transferred to the college at Helsingör, and took Andersen with him; but notwithstanding this kindness, he was merciless in his ridicule of his pupil's eccentricities, and Andersen's sensibilities were so much hurt that he was constrained to leave him. Another friend, L. C. Möller, introduced him to the university. His poetical contributions had already been received with favour in some of the leading Danish journals; and in 1828, the year of his admission to the university, he published his first considerable work, A Journey on Foot from Holmen's Canal to the East Point of Amager, which was received with marked favour. During the same year he produced at the Royal Theatre a comic vaudeville in rhymed verse, entitled Love on St. Nicholas' Tower, and at Christmas he published his first collection of poems. In 1830 he made a tour in Fünen and Jutland, and in 1831 he published Fancies and Sketches, which was severely criticised, and was less successful than his previous works. This and other disappointments—one of which was in the more serious affair of love—broke down his spirits, and he was advised to travel for his health. After an excursion to Germany he published Shadow Pictures of a Tour in the Hartz and Saxon Switzerland, Vignettes of Danish Poets, and a new volume of poems called The Twelve Months of the Year. Through the influence of Oehlenschläger and other friends he received a royal grant to enable him to travel, and in 1833, after passing through France, he visited Italy, his impressions of which he published in The Improvvisatore (1835)—a work which rendered his fame European, and which he dedicated, with appropriate gratitude and affection, to his friend Collin. The scene of his following novel, O. T., was laid in Denmark, and in Only a Fiddler he described his own early struggles. In 1834, immediately on his return from Italy, he published the poem of Agnete and the Merman, and in 1835 appeared the first volume of his Fairy Tales, of which successive volumes continued to be published year by year at Christmas, first under the title of Eventyr and afterwards of Historier, and which have been the most popular and wide-spread of his works. Among his other works are Picture-books without Pictures, A Poet's Bazaar—the result of a voyage in 1840 to the East—and a number of dramas. In the last species of composition he did not excel so much as in tales of imagination, although some of his fairy comedies attained great success. Among his numerous travels he visited England in 1848, and acquired such a command of the language that his next work, The Two Baronesses, was written in English. In 1845 he received an annuity from the government which made him independent. Among his later works may be mentioned, In Sweden (1849); an autobiography, under the title, My Life's Romance (1853), an English translation of which, published in 1871, contained additional chapters by the author, bringing the narrative down to the time of the Odense festival of 1867; To Be or Not To Be (1857); Tales from Jutland (1859); The Sandhills of Jutland (1860); The Ice Maiden, and In Spain (1863). Many of his works, particularly The Improvvisatore and The Fairy Tales, have been translated into most of the European languages. A German translation, in thirty-five vols. 12mo, appeared at Leipzig in 1847, and many of the English and other translations have been made from the German instead of the original. He died at Rolighed on 4th August, 1875. Andersen's tales are distinguished by simplicity, humour, tenderness, and poetical imagination. Personally he was egotistical to an extraordinary degree, but with an inoffensive egotism; he was also, from his over-sensitiveness, somewhat irritable.

ANDERSON, James, an agricultural and miscellaneous writer of great merit, was the son of a farmer at Hermiston, in Midlothian, Scotland, where he was born in the year 1739. He lost his parents when he was young, and at the age of fifteen took the management of a farm which his family had cultivated for many generations. Wisely judging that a knowledge of chemistry would facilitate his progress in improved farming he attended Dr. Cullen's class in Edinburgh University, and brought the results to bear on his profession. When scarcely twenty years of age he invented the small two-horse plough without wheels, known as the Scotch plough. Four years later he left Hermiston, and rented a large moorland farm of 1300 acres in Aberdeenshire. Here he devoted his leisure hours to writing on agricultural subjects, his first production being a series of essays on planting contributed to the Edinburgh Weekly Magazine, and signed 'Agricola'. In 1776 appeared his Essay on Chimneys, in which the principle afterwards acted on in the patent bath-stove was first explained. In 1780 he received from the University of Aberdeen the degree of LL.D. Anderson removed to Edinburgh in 1783 in order to superintend the education of his children. In 1784 he was employed by government to survey the western coast of Scotland with reference to the British fisheries—a task which he performed in the most efficient manner, but for which he received no remuneration. In 1791 he began to publish a literary and scientific journal called The Bee, in which he had the assistance of several men of taste and learning. In 1797 he went to London, where he undertook various works connected with his favourite study; but he followed his literary pursuits with so much assiduity that his health gave way under the pressure. From 1799 to 1802 he conducted a miscellany called Recreations in Agriculture, in which he anticipated some important principles since developed by Malthus, Ricardo, and West, especially the famous theory of rent. He died October 15, 1808, aged sixty-nine. Although a voluminous writer there is no subject connected with his favourite pursuit on which he did not throw new light.

ANDERSON, John, F.R.S., professor of natural philosophy in the University of Glasgow, and founder of the institution bearing his name in that city, was born in the parish of Roseneath, in Dumbartonshire, in 1726, being the eldest son of the minister of the parish. He received the more advanced part of his education at Glasgow University, where, in 1756, he was appointed professor of oriental languages. In 1760 he was appointed to the chair of natural philosophy, and entered upon his duties with enthusiasm, regularly teaching, in addition to his ordinary class-work, an *anti-toga* class, as he called it, for working-people and others whose pursuits did not enable them to conform to the prescribed routine of academical study. His valuable work entitled Institutes of

Physics, which appeared in 1786, went through five editions during the next ten years. A short time previous to the outbreak of the French revolution Anderson, having a taste for military art, had invented a species of gun the recoil of which was stopped by the condensation of common air within the body of the carriage. Having in vain endeavoured to attract the attention of the British government to this invention, he went to Paris in 1791, carrying with him a model, which he presented to the National Convention, which ordered Mr. Anderson's model to be hung up in their hall, with the following inscription over it—'THE GIFT OF SCIENCE TO LIBERTY'. As the Emperor of Germany had drawn a military cordon around the frontiers of France, to prevent the introduction of French newspapers into Germany, he suggested the expedient, which was successfully adopted, of making small balloons of paper, to which newspapers, &c., might be tied. Anderson died January 13, 1796. By his will, dated May 7, 1795, he directed that the whole of his effects should be devoted to the establishment of an educational institution in Glasgow, to be denominated *Anderson's University*. His will was so far carried into effect on the 9th of July following by the magistrates granting a charter of incorporation to the proposed institution. According to the design of the founder, there were to be four colleges—for arts, medicine, law, and theology—besides an initiatory school. As the funds, however, were totally inadequate to such a scheme, the institution was at first commenced with only a single course of lectures on natural philosophy and chemistry. The institution was placed by the will of the founder under the inspection and control of the lord-provost of Glasgow, and various other persons, as ordinary visitors, and under the more immediate superintendence of eighty-one trustees. It gradually enlarged its sphere of instruction, coming nearer and nearer to the original design of its founder, the medical school in particular possessing a high reputation. Latterly, however, it has been incorporated in the Glasgow and West of Scotland Technical College, the medical school only being retained as a separate institution, with the title of Anderson's College Medical School. Professor Anderson wrote Observations on Roman Antiquities between the Forth and Clyde.

ANDERSSON, CARL JAN, an African traveller, born in the province of Wermland, in Sweden, in 1827; died in the land of the Ovampos, in Western Africa, in July, 1867. In 1850 he accompanied the English traveller Galton to Africa, and along with him penetrated into the land of the Damaras and Ovampos, thus opening up a region hitherto little known. The purposed destination of the travellers, Lake Ngami, was not reached, however, on this journey; but in 1853 Andersson made his way thither, and explored also the Tioge, the northern and principal feeder of the lake. After publishing an account of this journey—Lake Ngami, or Discoveries in South Africa (London, two vols. 1856)—he returned in 1856 to Africa, where, after being for a time mine-overseer on the Swakop River, near the tropic of Capricorn, he started in 1858 to explore the Kunene, which enters the sea between lat. 17° and 18° S. On this journey he discovered, in 1859, the Okavango, or upper course of the Tioge, which was the subject of his next publication, The Okavango River (London, 1861). In 1860 he married, and settled as an ivory dealer at Otjimbingue, in the land of the Damaras, among whom he acquired the position of a chief. In a war against the neighbouring tribe of the Namaquas, in 1864, he had one of his legs shattered. He died in the course of a second expedition to the Kunene River.

ANDES, THE, or, as they are called in Spanish South America, CORDILLERAS (ridges) DE LOS ANDES, or simply CORDILLERAS, a range of mountains, of such vast extent and altitude as to render them one of the most remarkable physical features of the globe. It follows the whole of the west coast of South America, from Cape Horn to the Isthmus of Panama and the Caribbean Sea. Sometimes it is spoken of as a continuation of the Rocky Mountains in North America, but there seems to be no other reason for doing this than the continuity of the two divisions of America, and the fact that both ranges lie in the west of their respective continents. There is a sufficiently marked break between the ridges of the Isthmus of Panama and the range of the Andes of South America, and a still more distinct hiatus between the sierras of Central America and Mexico and the Rocky Mountains.

The south part of this huge chain begins to be continuous about lat. 52° S. From this point to about lat. 42° S., a distance of nearly 1100 miles, the range presses close to the Pacific Ocean. Its average height in this part is only about 3000 feet, though several summits rise some thousands of feet higher, namely, Mount Melimoyu, Yanteles (the highest, above 8000 feet), and the volcanoes of Corcobado and Minchinmadiva. The width of the chain in the extreme south is about 20 miles, further north it increases to 40 miles, and it attains a still greater width before it reaches lat. 42° S. About this latitude the chain begins to recede from the coast, leaving wide plains on the west 1000 or 1500 feet above sea-level. North of lat. 35° S. a double range may be traced, and the whole system of mountains widens out to about 130 miles. At about lat. 21° S. the direction of the chain, which up to this point is north and slightly east, begins to change a little to the west, and round this elbow, as it were, there is a large knot of mountains, partly in the Argentine Republic and partly in Bolivia, and consisting of chains running in various directions, some of which are not connected with the chain of the Andes. This knot of mountains forms part of the watershed which divides the rivers of the La Plata from those of the Amazon basin. Among the peaks, up to 21° S. lat., are the active volcanoes of Antuco, Maypú, and Tupungato; but the culminating point of this portion, and, so far as is known, of the whole Andes, is Aconcagua, which rises to the height of 23,028 feet, and is distinctly visible from Valparaiso, 100 miles distant. The Chilian Andes, under the 35th parallel of south latitude, are about 150 miles from the Pacific; but this distance decreases to about 80 miles in the latitude of Valparaiso.

At the point we have now reached, lat. 21° S., the Andes range bifurcates, forming two chains of great elevation, the Andes of Bolivia and Peru, which inclose the lofty table-land or longitudinal valley of the Desaguadero and Lake Titicaca. Of these two chains the western or Peruvian has the peaks of Sahama, Parinacota, Gualateiri, and Pomarape, above 21,000 feet in height; and the eastern or Bolivian (Cordillera Real) has those of Illimani and Sorata or Illampu (21,484 ft.). Of these the highest seems to be Gualateiri, the loftiest active volcano in the chain, 21,960 feet in height. Sahama, another active volcano, is 21,054 feet. These parallel cordilleras, the united breadth of which nowhere exceeds 250 miles, are united at various points by enormous transverse groups or mountain knots, or else by single ranges crossing between them like dikes. The descent to the Pacific is exceedingly steep; the dip is also very rapid to the east, whence offsets diverge to the level plains. The table-land of the Desaguadero, thus inclosed, has itself an absolute altitude of 12,900 feet,

a length of 400 miles, and an area of 150,000 square miles. A large eastern offset, the Sierra de Cochabamba, leaves the eastern cordillera under the 17th parallel, bounding the rich plain of Cochabamba north, and ending nearly under the 63d meridian of west longitude, at Santa Cruz de la Sierra. The two main cordilleras once more unite in the group of Vilcañota, in lat. 15° S., and the united range then runs about 280 miles north-west, to about lat. 10° S., where the Andes separate into three nearly parallel chains—the Eastern, Central, and Western Cordilleras, which inclose between them the rivers Huallaga and Upper Marañon; the Western or Coast Cordillera running north as far as the group of Loja, near the southern extremity of Ecuador.

About lat. 6° S., opposite the Point Aguja, the Andes chain again takes a course north and slightly east, forming, as in Chili, a single mass or rocky plateau, 80 miles broad, covered with a double series of highly-elevated summits, inclosing longitudinal valleys, one of which, that of Cuenca, in the group of Assouan, is upwards of 15,000 feet high, or nearly within the region of perpetual snow. North of this point the chain again divides, the western range comprising Mounts Chimborazo (21,060 feet), Iliniza, and Pichincha; while on the eastern range are the volcanoes Sangay, Tunguragua, Cotopaxi, Antisana (19,137 feet), and Mount Cayambe (19,535 feet). Shortly after entering Colombia, crossing the equator, the chain, in lat. 1° 5′ N., again meets in the knot or plateau of Los Pastos, on which is the volcano of Cumbal (15,620 feet); but a little north of the city of Pastos it once more bifurcates, inclosing the mountain plain of Almaguer, comprising the volcano of Purace (17,034 feet) on its eastern branch; and finally, somewhat north of the town of Popayan, the Andes separate into three distinct ridges—the Sierra di Choco, running north to the Isthmus of Panama; the Sierra di Quindiu, running east of the river Cauca; and the Sierra Suma Paz, extending east of the Magdalena to Lake Maracaybo and the city of Valencia in Venezuela. North of the 5th north parallel the only summits within the snow line on these cordilleras belong to the eastern chain, which also is very precipitous on its eastern slope. On the Quindiu or central chain is the volcano of Tolima (18,325 feet), in lat. 4° 46′ N. The Choco or coast chain is of comparatively small elevation, its highest point not exceeding 9000 feet. The total length of the Andes has been estimated at about 4400 miles.

Passes, Roads, and Railways.—This gigantic mountain chain is traversed in its different parts by numerous roads or passes, at heights almost equal to those of the extreme summits of the European ranges. Most of them are narrow, rugged, steep, and sometimes slippery and dangerous, passing through gorges, across yawning chasms, and up nearly perpendicular rocks; nor can they be attempted with success except by the active and well-practised native, or the enterprising, courageous, and well-provided traveller. It is worthy of remark, likewise, that nearly all these roads cross the ridge, running transversely and direct, not, as is sometimes the case in the Alps, by a circuitous course through the longitudinal valleys. Subjoined is a list of most of the known mountain passes, with their position, connected localities, and highest elevation, commencing with those on the south:—

Names.		Feet.
Portillo, lat. 33° 40′ S.	from Santiago to Estacada	above 14,000
Penquenes, lat. 33° 40′ S.	do. do. do.	,, 13,000
Cumbre, lat. 32° 52′ S.	from Valparaiso to Mendoza	,, 12,400
Pass of Tolapalca	from Potosi to Oruro	,, 14,000
Pass of Condur Pacheta	do. do. do.	,, 14,000
Pass of Pacuani	from La Paz to the Valley of the Beni	above 15,000
Pass of Gualillas, lat. 17° 50′ S.	from Arica to La Paz	14,750
Pass of Chullunquiani	do. do. do.	above 15,000
Pass of Alto de Toledo, lat. 16° 2′ S.	from Arequipa to Puno	,, 15,500
Angostura	between Tacora & Lake Titicaca	,, 10,500
Pass by San Mateo, lat. 11° 48′ S.	from Lima to Tarma and Pasco	,, 15,700
Alto de Tacaibamba Pass	from Jauja to Huanucò	,, 15,000
Alto de Lachagual Pass	from Jauja to Huanucò	,, 15,000
Road over the Paramo de Assuay	from Alausi to Cuenca	,, 15,500
Road over the Quindiu Pass	do. do. to Cartago	11,502

The first railway made in the Andes runs from the port of Mollendo, in the south of Peru, by Arequipa to Puno on Lake Titicaca, a distance of 217 miles, the eastern terminus being situated in a tableland 12,196 feet above the level of the sea. The first locomotive reached the shores of Lake Titicaca on the 1st of January, 1874. A more recent Peruvian railway was built from Lima to Oroya, a distance of 145 miles. The crest of the Andes is traversed by a short tunnel at an altitude of 15,645 feet above sea level. A great Transandine and transcontinental railway from Buenos Ayres to Valparaiso was completed in 1910. It crosses the Andes by way of the Cumbre or Uspallata Pass, and has necessitated much difficult engineering work, including a spiral tunnel about 10,000 feet long. This railway shortens the distance between Europe and Australia by about 10 days, and must become of great commercial importance. Other noteworthy lines are the long one from the Chilian port of Antofagasta to Oruro in Bolivia, and the one from Arica in northern Chili to La Paz in Bolivia, rising to the height of nearly 14,000 feet, and having a connection with the preceding.

Rivers and Lakes.—From the Andes rise two of the largest water systems of the world—the Amazon and its affluents, and the La Plata and its affluents. Besides which, in the north, from its slopes flow the Magdalena to the Caribbean Sea, and some tributaries to the Orinoco. The mountain chain pressing so close upon the Pacific Ocean, no streams of importance flow from its western slopes. The number of lakes interspersed through this vast mountain system is not great. The largest and most important is that of Titicaca on the Bolivian plateau.

Geology, &c.—In considering the geology of the Andes, the first fact that strikes the observer is the vast development of volcanic force along the whole length of the chain, and even continued north through Guatemala and Mexico. These volcanic vents occur in three linear groups, the most southern extending from the 42d to the 33d parallel of south latitude; the next from the 27th to the 15th parallel, and the last from lat. 2° S. to about lat. 5° N. Mention has already been made of the principal volcanoes. Another striking circumstance in the geology of this range is the fact that it consists almost entirely of sedimentary rocks, showing that its highest parts must at one time have been submerged. Granite comes so rarely to the surface in the northern parts of the chain, that, according to Humboldt, a person might travel for years in the Andes of Peru without meeting this species of rock; and he never saw any at a greater absolute elevation than 11,500 feet. Gneiss is sometimes found in connection with the granite; but mica-schist is by far the commonest of all the crystalline rocks. Quartz is likewise extremely abundant, generally mixed with

mica, and rich in gold and specular iron. Vast tracts of red sandstone, with gypseous and saliferous marls, occur in Peru. Porphyry and greenstone abound all over the range at every elevation, both on the slopes and extreme ridges; and trachyte is almost as abundant as porphyry, both in Peru and Chili, great masses of it, from 14,000 to 18,000 feet thick, being visible on Chimborazo and Pichincha. As respects volcanic products, the western face of the Andes presents immense quantities of lava, tufa, and obsidian, none of which are found on the eastern side; this remark applies especially to that part of the chain lying between Chili and the equator. Fossil remains are by no means common; but in the limestone strata of the coast, towards the northern extremity of the range, Humboldt found many marine shells of the silurian period, about 30 miles from the coast; and Pentland observed others of the same era at a height of 17,500 feet on the mountain of Atacama, as well as in several other parts.

Earthquakes.—Many of the volcanoes, as before observed, are in a state either of constant or occasional action; it cannot, therefore, be matter of surprise that there should be frequent and violent earthquakes. All the districts of the Andes system, but Chili especially, have suffered more severely from these oscillations than any other part of the world; and among the towns either destroyed or greatly injured by these visitations may be mentioned Bogotá, Quito, Riobamba, Lima, Callao, Valparaiso, and Concepcion. In 1819 Copiapo was entirely overturned, not a house being left standing. Concepcion was twice destroyed—in 1730 and 1751; and in November, 1822, an earthquake was felt on the same day at this town, in lat. 37° S., and at Lima in lat. 12° N., more than 1700 miles distant; it was on this occasion that Valparaiso, Melipella, and Quillota were all but completely annihilated. This earthquake, too, had the remarkable effect of upheaving the land on the coast, upwards of 100 miles in extent, to the height of 3 or 4 feet, and elevating a portion of the shore above high-water mark. These shocks continued at brief intervals till the autumn of 1823; and since that time the volcanoes of Maypú, until then for many years quiescent, have had frequent eruptions. In 1868 the towns of Arequipa, Iquique, Tacna, and others in Peru and Ecuador, were destroyed; and in 1906 great damage was done to Valparaiso, &c. In fact, earthquakes, slight or more serious, are of yearly occurrence, and even considerable tremors are regarded with little more attention than a hail-storm in Europe.

Mineral Produce.—The Andes are extremely rich in the precious metals. In Chili, Bolivia, Peru, and Colombia, gold is obtained. Silver occurs in Chili in the provinces of Coquimbo and Atacama, and the mines of these districts are remarkable for the richness of their ores. The Peruvian Andes have numerous silver mines scattered over their whole extent, from the province of Caxamarca south to the confines of Chili; but incomparably the richest are the mines of Cerro de Pasco, which have been worked upwards of two centuries. The mines of Chota likewise, which are situated on Mount Hualgayoc, are productive. The ore, which is richer even than that of Pasco, lies either on or very near the surface. Close to the Pacific, at Huantajaya, in the district of Arica, are several mines celebrated for the quantity of virgin silver found therein, sometimes in masses of great weight. The most famous mines are those of the Cerro de Potosi, in Bolivia, lat. 19° 36′ S., which is perforated in all directions by thousands of openings, some of which are within 100 feet of the summit (16,000 feet). Quicksilver is found in several parts of the Andes, but impure, in combination with sulphur, forming the red sulphuret of mercury, commonly known as cinnabar. Copper is found both in the east and west cordilleras of Peru; but the east chain is too far from the coast to admit of mines being profitably worked. The copper mines of Chili are the most valuable. They are situated chiefly in the desert of Atacama. Tin also, wrought in Chili, forms an article of export; but lead and iron, though plentiful, are not wrought. A good deal of platinum is obtained from the district of Choco in Colombia.

Climate and Meteorology.—On the west side of the range little or no rain falls, except in the south; and scanty vegetation appears only on spots, or in small valleys, watered by streams from the mountains; while, on the opposite slope, excessive heat and moisture combine to give the range a thick covering of tangled forest trees and dense brushwood. Currents of cold west and north-west winds blow nearly all the year from the ice-topped cordilleras, on the plateau beneath, daily accompanied during four months by thunder, lightning, and snow storms. Currents of warm air are also occasionally found on the crest of the Andes; they usually occur two hours after sunset, being both local and narrow, like the hot blasts in the Alps, not exceeding a few fathoms in width. They run parallel to each other, and so closely that five or six of them may be passed in a few hours. They blow chiefly from S.S.W. to N.N.E. and are especially frequent in August and September. Notwithstanding the great number of snow-clad summits, glaciers are of rare occurrence in the Andes, being found only, and then of but small extent, in the narrow ravines which furrow the sides of some of its giant summits.

Vegetation.—In the low burning plains that flank the bases of the Andes reign the banana, cycas, plantain, cassava, cacao, the cotton-tree, indigo and coffee plant, and sugar-cane, all of which are extensively and profitably grown below the altitude of 4000 feet. Maize is likewise plentiful, and may be said to form the bread of the Peruvians; it is of three different kinds, and is cultivated up to about 7000 feet above the sea. Within the same limits also are found, either wild or cultivated, the pine-apple, pomegranate, shaddock, orange, lime, lemon, peach, apricot, together with olives, aji or pepper plants, tomatoes, and sweet-potatoes, and gum copal, copaïba balsam, dragon's blood, sarsaparilla, and vanilla. To these groups succeed, in the humid and shaded clefts on the slopes of the cordilleras, the tree-ferns, and cinchona or cascarilla, from which we derive the febrifuge bark and quinine. Between the heights of 6000 and 9000 feet is the climate best suited for the European cereals. To these may be added the quinoa (*Chenopodium Quinoa*), a most useful production for domestic uses. In this region also, and a little above it, grow the potato (indigenous to South America, and thence introduced into Europe), and various congeners, some of them used as food; and here likewise grow the chick-pea, broad-bean, cabbage, and other European vegetables. Within the cereal limits are found the oak, elm, ash, and beech, which never descend lower than 5500 feet, and seldom rise higher than 9200 feet above the sea. Above this level the larger forest trees, except the pine, begin to disappear.

Zoology.—Among the carnivorous animals of the Andes the principal are the jaguar, puma, ounce, ocelot, and wild cat. There are also bears, tapirs, racoons, wild hogs, foxes, and otters, with several species of deer. The characteristic animals, however, are the llama and its different congeners—the guanaco, vicuña, and paco or alpaca. They are the chief

beasts of burden on the Andes. The forests of the warmer regions abound with members of the monkey tribe, &c. Many varieties of serpents are found. Bats are numerous and of large size, the vampire-bat being one of the most remarkable. The condor soars over the highest summits and makes its nest among the highest and least accessible rocks; other birds of prey are also numerous. Curassows, wild turkeys, parrots, and parrakeets are common in the woods, and there are many varieties of smaller birds.

ANDESITE, a crystalline volcanic rock of very wide occurrence, consisting mostly of felspar mixed with other ingredients, especially hornblende and augite, often also hypersthene and mica, the four chief varieties being named accordingly. Andesite is often porphyritic in character, with large scattered crystals of felspar. These rocks are commonly eruptive products of volcanoes of the tertiary or more recent periods, and are common in the lavas of volcanoes in the Andes. The Ochils and other hills of middle Scotland largely consist of andesite.

ANDOCIDES, one of the ancient Attic orators, born at Athens in 467 B.C. In 436 B.C. he had, with Glaucon, the command of the fleet sent to succour Corcyra when threatened by the Corinthians, and subsequently held other appointments. In 415 he was deprived of his rights as an Athenian citizen for having shared the crime of Alcibiades in profaning the mysteries and mutilating the hermæ, and was thus obliged to leave Athens, after causing the death of several persons whom he had accused of these crimes. During the tyranny of the Four Hundred, in 411, he returned to Athens, but was not allowed to remain there long. He again returned in the following year and delivered a speech (still extant), in which he pleaded for permission to reside at Athens, but without avail. At last in 403, after the overthrow of the Thirty Tyrants by Thrasybulus, when a general amnesty was proclaimed, Andocides, having again returned to Athens, was permitted to remain undisturbed, although in 400 his enemies revived the charge against him of having profaned the mysteries. The speech on the mysteries in which he defended himself on this occasion is also still extant. In 394 B.C. he was sent to conclude a peace with Sparta, on his return from which he was accused of illegal conduct in carrying out this mission, and being condemned he retired once more into exile, dying apparently not long after. The speech in which he defended himself against this last accusation, On the Peace with Lacedæmon, has also come down to us. A fourth speech, Against Alcibiades, attributed to him is probably spurious.

ANDORRE, or ANDORRA (Arabic, *Aldarra*, a place thick with trees), a small independent republic comprising three mountain valleys in the north of Catalonia in Spain, on the south side of the Pyrenees and south of the department of Ariége in France, extending from north to south about 17½ miles, and 20 from east to west, with an area of about 250 square miles. It is watered by the Embalira, Ordino, and Orien, affluents of the Segre, which is itself tributary to the Ebro. It comprises very little arable land, but extensive pastures, and presents some highly picturesque scenery. The crops include barley and rye; and potatoes, cabbages, and other vegetables, as well as the vine and tobacco plant are cultivated. The mountain-sides are partly clothed with valuable timber, especially pine, oak, and willow. The country is rich in iron and lead. There is abundance of marble, slate, and granite, and numerous mineral springs, both hot and cold. Andorra is governed by its own civil and criminal codes, and has its own courts of justice, the legislative power being vested in a council of twenty-four representatives, elected for four years by the six parishes into which this state is divided, and presided over by a syndic or president, chosen for life, and two vice-presidents. The laws are administered by two vicars (French *viguiers*, Latin *vicarii*) or judges, one of whom is chosen by the Republic of France, the other by the Bishop of Urgel in Spain, and a civil judge nominated alternately by France and the Bishop of Urgel. The little republic pays annually 920 francs (about £37) to France and 460 francs to the Bishop of Urgel. All the male inhabitants are liable to military service, and are provided with firearms, each parish company being commanded by a captain and two subalterns. The commerce is confined to a few necessary articles, and is partly carried on by smuggling over the French or the Spanish frontiers. There is postal and telegraphic communication with France, and thus with the outer world. Iron is wrought, its manufacture into tools and implements being also conducted to some extent; but this and every other branch of industry is carried on in the rudest and most primitive manner. The inhabitants, all of whom are strict Roman Catholics, are extremely simple and austere in their manners, ignorant of and indifferent to the luxuries of cities, their wealth consisting either of cattle, sheep, horses, mules, &c., or a share in the iron mines, and very few being owners of any land beyond a small plot adjacent to their cottages. Their clothing, too, is equally simple and rough, composed of coarse brown woollen cloth of home manufacture. Each family has a chief, determined by primogeniture; and these are always supposed to choose their wives from families of equal rank with their own. The young men always reside with their parents until they marry; and, unless married, they are allowed no share in the management of public affairs. Education is at a low ebb; but in each parish there is a school, in which the children are taught gratuitously. The capital, Andorra, is an ill-built dirty place, standing at the height of about 3200 feet, with 1000 inhabitants. The common language of the people is a dialect of the Catalan. In person the Andorrians are strong and well proportioned, almost unacquainted with disease, and nearly equally so with crime. This remarkable little republic owes its independence to Charlemagne, who in 790 gave the people the privilege of governing themselves with their own laws; and these rights were further confirmed by his son Louis le Débonnaire, who nevertheless, in 819, ceded the spiritual superintendence to the Bishop of Urgel. These rights have ever since been respected. (See paper by a recent visitor in the Scottish Geographical Magazine for 1895.) Pop. about 6500.

ANDOVER, a market-town and municipal borough in England, in the county of Hants, beautifully situated near the Anton, 12 miles north by west of Winchester. It contains a spacious new church, besides other places of worship, a handsome town-hall with a Grecian front, supported by arches, under which a considerable corn-market is held every Saturday. The manufacture of silk and shalloons was formerly carried on to a considerable extent, but the chief trade of the town is now confined to corn, malt, and the supply of general goods to the surrounding country. Near the town are several ancient encampments, and some beautiful specimens of Roman pavement have been discovered in the neighbourhood. This town now gives name to a parliamentary division of the county. Previous to 1885 Andover returned one member to Parliament as a separate borough. Pop. in 1901, 6509.

ANDOVER, a town in the United States, in Essex county, Massachusetts, 22 miles north of

Boston, beautifully situated on the right bank of the Merrimac. Its manufactures are considerable, but it is chiefly remarkable for two educational institutions—Phillip's Academy, founded in 1788; and the Andover Theological Seminary, founded in 1807. A normal seminary, for the training of teachers, was founded at Andover in 1830. Pop. (1900), 6813.

ANDRÉ, Major John, adjutant-general in the British army in North America during the revolutionary war, was born in 1751. Employed to negotiate the defection of the American general Arnold, and the delivery of the works at West Point, he was apprehended in disguise, Sept. 23, 1780, within the American lines and sent prisoner to General Washington, who submitted his case to the examination and decision of a board of general officers, consisting of Major-general Greene, William Alexander (Lord Stirling), the Marquis de la Fayette, &c. The board declared him a spy from the enemy, and he was hanged at Tappan, in New York, Oct. 2, 1780. His remains were brought to England in 1821 and interred in Westminster Abbey, where a monument has been erected to his memory. He is the author of a satirical poem entitled The Cow Chase (1780). See Arnold.

ANDREA DEL SARTO. See Sarto.

ANDREÆ, Johann Valentin, a German author of the seventeenth century, born at Herrenburg, not far from Tübingen, in 1586, studied at Tübingen for the church, and held various situations in it, in all of which he distinguished himself by his zeal in the cause of truth. He was the author of numerous tracts, several of them of an amusing and satirical character. His best-known works are entitled Menippus and Satyricorum Dialogorum Centuria. His autobiography has also been published. He was long believed to be the founder of the celebrated Rosicrucian order, an opinion that received a certain support from three works—Fama Fraternitatis R. C. (that is Roseæ Crucis), published in 1614, Confessio Fraternitatis R. C. (1615), and Die chymische Hochzeit Christiani Rosenkreuz, the last of which was acknowledged by himself as his work, while the other two bear every internal mark of having proceeded from the same source. These works professed to give an account of a secret society actually in existence practising strange rites with a high symbolical meaning, and holding abstruse theosophic doctrines, but in all probability the real intention of the writer was to ridicule a prevalent folly of the age. (See Rosicrucians.) Andreæ died at Stuttgart in 1654.

ANDREASBERG, St., a mining town of the Harz Mountains, in Prussia, in the province of Hanover, in the landdrostei of Hildesheim, 57 miles S.S.E. of the town of Hanover, on a site upwards of 1800 feet above sea-level, a little to the south-west of the Brocken. The minerals obtained in the mines of the district are silver, copper, lead, arsenic, &c. The Samson shaft, 2950 feet deep, is the deepest mine in the Harz. Pop. 3500.

ANDREW, St., brother of St. Peter, and the first disciple whom Christ chose. Both brothers were fishermen, but left their business and followed the Redeemer. The fate of Andrew after Christ's death is uncertain. Different Christian fathers represent him as having preached in Scythia, in Thrace and Asia Minor, and in Achaia (Greece), and according to tradition he was crucified at Patræ. The Russians revere him as the apostle who brought the gospel to them; the Scots, as the patron saint of their country. The day dedicated to him is the 30th of November, which is the reputed anniversary of his martyrdom. Eusebius mentions an apocryphal Acts of St. Andrew.—The order of St. Andrew or the Thistle is the distinctively Scottish order of knighthood. (See Thistle.) There is also a Russian order of St. Andrew, instituted by Peter the Great in 1698. —The *cross of St. Andrew*, a cross of the form X, is so called because, according to tradition, St. Andrew was executed on a cross which had this shape.

ANDREWES, Lancelot, an eminent bishop of the English Church, was born near Barking, in Essex, in 1555. He finished his education at Pembroke Hall, Cambridge, and was elected a fellow of his college in 1576. Having taken orders he was appointed to the parsonage of Alton, afterwards to the vicarage of St. Giles, Cripplegate, and in 1589 was made a prebend and canon of St. Paul's, and master of Pembroke Hall. Queen Elizabeth highly esteemed him, and appointed him one of her chaplains in ordinary, besides bestowing other preferment upon him; and he was in no less favour with James I. In 1605 he became Bishop of Chichester, and in 1609 was translated to Ely, and appointed one of the king's privy-councillors. In 1618 he was translated to Winchester, where he died in 1626. He was one of the finest preachers of his time, and absolutely the most learned of English theologians. He was one of those engaged in preparing the authorized version of the Scriptures, and he also took part in the Hampton Court Conference. He left sermons, lectures, and other writings, the most celebrated of which among scholars is Tortura Torti (1609), which he wrote against a publication of Cardinal Bellarmine, who, under the fictitious name of Matthew Tortus, had attacked James I.'s work defending the rights of kings. A manual of private devotions compiled by him in Greek and Latin has been well known through several English translations.

ANDREWS, St., an ancient city of Scotland, in Fifeshire, 31 miles north-east from Edinburgh. It certainly was of ecclesiastical, possibly of monkish foundation. It was erected into a royal burgh by David I. in 1140, and after having long been an episcopal, became an archiepiscopal see in 1472. From the earliest period of the history of the Scottish Church the Bishop of St. Andrews seems to have had precedence of all the other Scottish clergy. The archbishop ranked in dignity next to the royal family. In the thirteenth century the revenue of the see was not less than £40,000 of our present money. The cathedral, begun about 1160, was consecrated in presence of King Robert the Bruce in 1318. After the Reformation it became a ruin. The old castle, founded by Bishop Roger about 1200, and rebuilt by Bishop Trail in the fourteenth century, is now also an almost shapeless ruin. In this castle Bishop Kennedy lived, James III. was born probably, and Cardinal Beaton assassinated; and in front of it George Wishart was burned. South of the cathedral ruins are the chapel and tower of St. Rule or Regulus; the tower is 109 feet high. Contiguous are some fine remains of an old priory, recently much restored by the Marquis of Bute, and not far off parts of the city walls stand. St. Andrews deservedly derives much importance from its educational foundations, the principal of which are the university, founded in 1411 (see the following article), and the Madras College, an endowed secondary school founded by Dr. Andrew Bell of Madras, who died in 1831. Besides it and the public schools there are other high-class schools, including the celebrated St. Leonard's school and St. Catherine's for girls; Clifton Bank and St. Salvator's for boys. The trade and manufactures (chiefly golf clubs and cleeks) of St. Andrews are of small importance, but the town is in high favour as a seaside resort. It has long been the head-quarters of the game of golf, which is played on the fine *links*. St. Andrews unites with East and

West Anstruther, Crail, Cupar, Kilrenny, and Pittenweem in returning a member to Parliament. Pop. in 1901, 7621. Its valuation has trebled within the last twenty-five years.

ANDREWS, St., University of, the oldest of the Scottish universities, founded by Henry Wardlaw, bishop of St. Andrews, in 1411, confirmed by a papal bull granted by Benedict XIII. in 1413. Three colleges were established in connection with it during this and the following century: that of St. Salvator, founded in 1450 by James Kennedy, bishop of the diocese, and confirmed by Pope Nicholas V. in 1451; that of St. Leonard, founded by Alexander Stuart, archbishop of St. Andrews, and John Hepburn, prior of the Augustinian monastery of St. Andrews in 1512; and that of St. Mary, founded in 1537 by Archbishop Beaton (uncle of Cardinal Beaton), on the site of the original building belonging to the university. Originally all the three colleges had teachers both in arts (or philosophy) and theology; but in 1579 the colleges of St. Salvator and St. Leonard were confined to the teaching of philosophy, law, and medicine, and that of St. Mary to theology. In 1747 the two former colleges were united by act of Parliament, and form the United College of St. Salvator and St. Leonard. In 1897 the University College, Dundee, was affiliated to and made to form part of the university. At the present day the university thus embraces four distinct corporations: the three teaching colleges and the degree-granting university. The combined teaching staff includes twenty-nine professors and twenty-five lecturers and university assistants. The principal of the United College is principal of the university and president of the senatus academicus. The university court is composed of the rector, the principal of the university, the principals of St. Mary's College and of University College, Dundee, the provosts of St. Andrews and Dundee, and nine assessors, appointed one by the chancellor, one by the rector, four by the general council, and three by the senatus academicus. St. Andrews has the right by its foundation bulls and charters of conferring degrees in every lawful faculty. The regulations for obtaining degrees in St. Andrews being similar to those in the other Scotch universities, it is sufficient to refer to the articles on Edinburgh and Glasgow universities. Degrees are conferred, after courses of study and examination, in arts, divinity, medicine, law, and science, including engineering and public health. By the Universities (Scotland) Act of 1889 power was given to the university commissioners to admit women to graduation, and in 1892 the classes in all the Scottish universities were opened to women, who are taught in most subjects along with the men. The average number of students in St. Andrews has increased in recent years, and those who matriculated in 1909–10 numbered 571. The colleges are fairly well provided with bursaries, and there are also some scholarships for graduates. In the university is a library founded by James VI. in 1610, and now containing about 120,000 printed volumes, together with a number of MSS., some of them of great interest and value. The University of St. Andrews unites with that of Edinburgh in sending a member to Parliament, the electing body being the general council of each university, which, speaking generally, consists of all the graduates. The university numbers among its distinguished alumni many of the most famous names in Scottish history.

ANDRIA, a town of South Italy, in the province of Bari, and 30 miles west by north of the town of that name. It is built on a plain; is the seat of a bishop, and has a fine cathedral, founded in 1046 by Peter Normanno, count of Trani, but completely altered by modern restorations; the church of Sant' Agostino, with a beautiful pointed Gothic portal; and a college. Andria was a favourite residence of the Emperor Frederick II., and both his wives are buried in the cathedral. The town has manufactures of majolica, and has a good trade in almonds. Pop. (1881), 36,795; (1901), 49,569.

ANDROCLUS, according to the well-known story, a slave, who, being exposed to a lion in the circus, at Rome, was not injured by the animal, because he had formerly taken a thorn out of its foot when hiding from his master, a proconsul, in the Libyan Desert. He was in consequence liberated, and led the lion about the streets of Rome. The story is found in Seneca's De beneficiis, and in Aulus Gellius.

ANDROMACHE, daughter of Eëtion, king of Thebes in Cilicia, and wife of Hector, one of the most attractive female characters of the Iliad. The passage describing her parting with Hector, when he was setting out to his last battle, is well known and much admired. After the conquest of Troy she became the prize of Pyrrhus, son of Achilles, who carried her to Epirus, and had three sons by her, but afterwards left her to Helenus, brother of Hector, to whom she bore a son. After the death of this third son she went with Pergamos, one of the sons she had borne to Pyrrhus, to Asia, where she died. A sanctuary was erected to her at the town of Pergamos. Euripides and Racine have made her the chief character of tragedies.

ANDROMEDA, daughter of the Ethiopian king Cepheus and of Cassiopeia. The mother and daughter were very beautiful. The former having boasted that her daughter surpassed the Nereides, if not Hēra (Juno) herself, in beauty, the offended goddesses called on their father Poseidōn (Neptune) to revenge the insult. He not only inundated the territory of Cepheus, but also sent a horrid sea-monster, which threatened universal destruction. The oracle of Ammon declared that the wrath of Poseidōn could not be appeased unless Cepheus delivered his daughter to the monster. Perseus beheld her fastened to a rock when he was returning from his victory over Medusa with the head of the Gorgon in his hand, and mounted on Pegasus. Touched by compassion the hero slew the monster, and obtained the virgin in marriage. The story of Andromeda forms the subject of one of the tragedies of Corneille.

ANDRONICUS CYRRHESTES, a Greek architect, celebrated for having constructed at Athens the Tower of the Winds, an octagonal building, still standing, on each side of which is a figure representing one of the winds. On the top of the tower was a small pyramid of marble supporting a brazen Triton, which turned on a pivot, and pointed with its rod to the side of the tower on which was represented the wind that was then blowing. Each of the sides had a sort of dial, and the building formerly contained a clepsydra or water-clock. He probably lived about 100 B.C.

ANDROS, now called *Andro*, an island in the Grecian Archipelago, the most northerly of the Cyclades, separated from Eubœa (Negropont) by a channel about 8 miles wide. The island is about 25 miles long and 6 or 7 broad, and has an area of 100 square miles. It is in general mountainous, rising to the height of 3200 feet in the centre, but it has many fertile valleys. It is well watered, and altogether one of the richest and most productive islands of the Archipelago. The inhabitants rear sheep and cattle, bees, and silkworms, silk being one of the chief products of the island, and cultivate wheat, barley, vines, olives, oranges, citrons, and pomegranates, which together form the source of an extensive traffic. Andro or Castro, the capital

(pop. 1700), situated on a hill on the east coast, carries on a considerable trade for its size. After the foundation of the Latin Empire at Constantinople, the island of Andros received from Venice a prince of its own in the person of Marino Dandolo, whose descendants held out against the Turks till 1566. Pop. (1896), 18,809.

ANDROS ISLANDS, a group of isles in the West Indies belonging to the British colony of the Bahamas, lying west of New Providence, and about 150 miles south-east of Florida. The passages through them are dangerous. Andros Island is about 60 miles long, and has an average breadth of about 30 miles. On the east it is skirted by a narrow ridge, 70 to 100 feet high, but generally the surface is low and swampy. It is well wooded, but little cultivated. Its few inhabitants, who have their chief settlement at Red Bay near its north-west extremity, employ themselves chiefly in collecting sponges and preparing timber for shipment. Sisal hemp has recently begun to be cultivated.

ANDUJAR, or ANDUXAR, a town in Spain, in Andalusia, in the province of Jaen, and 20 miles north-west of the town of Jaen, at the foot of the Sierra Morena, in a wooded plain on the right bank of the Guadalquivir, which is here crossed by a fine bridge of seventeen arches. It is a cheerful-looking place, though rather irregularly built. The principal industry consists in the manufacture of porous earthen water-bottles and jugs (*alcarazas*), which are used in summer to keep water cool, and with which Andujar supplies the rest of Spain. Pop. (1900), 16,302.

ANEGADA, one of the Virgin Islands, in the West Indies, belonging to Britain, 90 miles north-east of Porto Rico. Its greatest length, east to west, is 10 miles; greatest breadth, 4½ miles. The surface is for the most part a dead level, but on the south-east side the ground rises gradually to the height of about 60 feet. The whole north side is exposed to the sea, which often overflows portions of the surface (the name is Spanish for inundated or submerged). The island contains numerous large salt-ponds, from which quantities of salt are obtained. It produces crops of vegetables, &c.; and the inhabitants (who are few in number) rear cattle, sheep, and goats. It has abundance of fresh water. The island has an unhappy celebrity for wrecks. With the other Virgin Islands belonging to Britain (Tortola, Virgin Gorda, &c.) it forms a presidency of the federal colony of the Leeward Islands.

ANEMOMETER (from the Greek words *anemos*, the wind, and *metron*, a measure) is an instrument for measuring the force and velocity of the wind. In the earlier instruments of this nature it was always the force or pressure of the wind that was measured directly, and the velocity calculated therefrom; but as the most important thing practically is to know the velocity of the wind, and as it is rather a cumbrous operation to deduce the velocity when the force is so variable, anemometers are always constructed nowadays so as to indicate directly the velocity. Usually a vane is connected with the instrument in order to show at the same time the direction of the wind, and sometimes to keep the apparatus in a proper position to receive the full force of the wind. A simple and very efficient instrument is that invented by Dr. Lind, which consists merely of two upright glass tubes, about 9 inches long and $\frac{4}{10}$ths of an inch in diameter, connected below by a small bent tube only $\frac{1}{10}$th of an inch in diameter. A scale of inches and parts is fixed between the tubes, and one of them is fitted at the top with a metallic cup or funnel, bent at right angles so as to present its mouth to the wind. Water is then poured into the other till it rises to about the middle of both tubes; and when the wind blows in at the mouth of the cap it depresses the water in the one tube and raises it to an equal extent in the other. The difference of height between the two columns of water indicates the force of the wind, from which its velocity may be deduced. Thus a difference of $\frac{1}{10}$th of an inch indicates a gentle wind, exerting a pressure of rather more than 2 oz. 1 drachm upon a square foot of surface, and moving at the rate of about 5½ feet in a second, or not quite four miles an hour; a difference of 1 inch denotes a high wind, the pressure of which is 5¼ lbs., and its velocity 32½ miles an hour; with 3 inches the force is upwards of 15½ lbs. on the square foot, the velocity 56¼ miles per hour, and the character a storm; at 9 inches the force is 46 lbs. 14 oz., and the velocity 97½ miles an hour, producing a most violent hurricane. There is a very simple kind of pressure anemometer, in which a plate is swung freely by a hinge on a horizontal bar, and the force of the wind is indicated by the amount of deviation of the plate from the perpendicular. Osler's anemometer, one of the best on the pressure principle, and one still largely used, also measures the force of the wind by means of a plate swinging like a pendulum; but in this case the plate is not allowed to swing freely, but is forced by the wind against one or more springs, and it is by the depression of these springs that the pressure of the wind is indicated directly. A vane is used to keep the swinging plate in opposition to the wind. Connected with this instrument is a registering apparatus for recording both the direction and the strength of the wind. Whewell was the inventor of the first good anemometer that indicated directly the velocity of the wind. His instrument, however, need not be described, as it has been entirely superseded by more recent inventions. Perhaps the best of the anemometers of this kind is that known as Robinson's cups, Dr. Robinson of Armagh having been the first to apply in a satisfactory manner a principle previously suggested. In this instrument four hemispherical hollow cups are attached to the ends of two horizontal rods that bisect one another perpendicularly, and which are balanced at their point of bisection on an upright spindle in such a manner as to be able to revolve freely. The mouth of each cup is turned towards the bottom of the next in front, so that in whatever direction the wind may blow it is always received by the hollow of the cups on one side of the spindle, and strikes against the hemispherical bottom of those on the other side. The wind thus always acts with greater force on the one side of the spindle than on the other, driving the cups round in a constant direction, and the rate at which the cups revolve affords a measure of the velocity of the wind. Dr. Robinson found by experiment that the rate of revolution is almost exactly one-third of this velocity. A vane is usually connected with the cups, but this is not required for the anemometer itself. Dr. Robinson also devised a self-registering apparatus, but this has been generally replaced by a superior one, the invention of a Mr. Beckley of the Kew Observatory. A register sheet is wrapped round a cylinder which revolves by clock-work at a uniform rate, once in twenty-four hours. Two pencils are in gentle contact with the surface of the paper, one acting over one-half of the length of the cylinder, and recording the velocity, and the other acting over the other half and recording the direction. The corresponding halves of the register sheet are each marked by vertical and horizontal lines, the vertical lines indicating in the one case the number of miles passed over by the wind, and in the other the changes in the direction of the wind, and the horizontal lines indicating the time taken in both cases.

ANEMONE, wind-flower; in botany, a genus of plants of the natural order Ranunculaceæ, with a petaloid calyx scarcely to be distinguished from the corolla. It has its name from the Greek *anemos* (the wind), because it is supposed not to open unless the wind blows. The genus includes many species: among those valuable on account of their beauty are the following: 1, *Anemone apennina*, a native of Britain, growing in the woods; 2, *Anemone coronaria*; 3, *Anemone hortensis*; both natives of the Levant, particularly of the Archipelago islands, where the borders of the fields are covered with them; 4, *Anemone nemorosa*, growing wild in the woods in many parts of Britain, where it flowers in April and May; 5, *Anemone pulsatilla*, or Pasque-flower, found on some chalky pastures in England. Some species are favourite garden flowers.

ANEMONE, Sea. See Sea-anemone.

ANEMOSCOPE, any contrivance indicating the direction of the wind. The simplest is the well-known vane. In some the vane turns a spindle, descending through the roof to a chamber, where, by means of a compass-card and index fixed in the ceiling, the direction of the wind is ascertained. Sometimes the direction is shown by an index on a perpendicular dial. There are also some which are self-registering.

ANEROID BAROMETER, a species of barometer in which no fluid is employed, an ingenious and delicate instrument, invented by M. Vidi, of France, in 1844, and first introduced generally to the scientific world of Britain at the meeting of the British Association at Swansea, in 1848. Its mechanism consists of a hollow metal cylinder, with thin and corrugated sides, which contract or expand according to the pressure of the atmosphere, the air within having been previously exhausted by the air-pump. The motion of the sides of the cylinder acts upon a principal lever, attached to it, and connected with two smaller levers, to one of which a chain is attached, working upon a roller, and to the axis of the roller a hand is fixed, exhibiting the variations of the atmosphere by means of an index on the face of the barometer. (See plate at the article Barometer.) A pocket aneroid is very useful for measuring small heights. The name is said to be derived from the Greek *a*, privative, *nēros*, moist, and *eidos*, form, to denote the absence of the action of fluid, which distinguishes it from other barometers.

ANEURISM, the swelling of an artery, or the dilatation and expansion of some part of an artery. Aneurisms arise partly from the too violent motion of the blood, partly from excessive debility of the membranes of the artery, which is sometimes constitutional. They are therefore more frequent in the great branches of the arteries; in particular, in the vicinity of the heart, in the arch of the aorta, and in the extremities, for instance, in the ham and at the ribs, where the arteries are exposed to frequent injuries by stretching, violent bodily exertions, thrusts, falls, and contusions. They may, however, be occasioned also, especially the internal ones, by diseases, violent ebullitions of the blood, by the use of ardent spirits, by vehement passions and emotions, particularly by anger; in such cases the arteries may be ruptured, and sudden death produced. The external aneurisms are either healed by continued pressure on the swelling, or by an operation in which the artery is laid bare and tied above the swelling, so as to prevent the flow of the blood into the sac of the aneurism, which contracts by degrees. Sometimes the ligature is applied both above and below the aneurism.

ANGARA, a large river of Siberia, which issues from Lake Baikal, and, passing the town of Irkutsk, pursues a northerly and westerly course for about 750 miles, when it is joined by the river Tchadobetz in lat. 57° 30′ N.; lon. 97° 0′ E., at which point its name is changed to the Tunguska, by which it is known for about 320 miles, when it falls into the Yenisei at lat. 57° 10′ N.; lon. 92° 0′ E. It is navigable, but much obstructed by rapids. The scenery on its banks, particularly on the left, is described as extremely picturesque, the latter being adorned by magnificent forests of cedar and other trees.

ANGEL (from the Greek *angelos*, a messenger) may be used, in a general sense, to designate any minister or agent whom God employs to carry his commands, execute his purposes, or display his power, but is more especially applied to myriads of spiritual intelligences, who dwell immediately in his presence and encircle his throne. To these the name of good angels is sometimes given, to distinguish them from bad angels, who were originally created to occupy the same blissful abode, but lost it by rebellion. Scripture speaks of angels with great reserve, and it becomes us to imitate its example. According to the majority of writers they were created long before the visible world; according to others, at the same time as the heaven and earth, when God commanded the light to be, and his Spirit moved over the waters. As the official servants of the Deity, angels are employed in various capacities, for example, as the tutelary spirits of whole nations and kingdoms, the guardians of individuals, and the directors of particular events; and differences of rank appear to exist among them, leading to a classification of them into nine orders or ranks, forming three hierarchies: (1) cherubim, seraphim, thrones; (2) dominations, principalities, powers; (3) virtues, archangels, angels. From the Apocalypse (and Tobit) it would appear that there are seven holy angels who present the prayers of the saints and go out and in before the glory of the Holy One. Some have supposed them to be spirits with ethereal bodies. Those who regard the body merely as an incumbrance or prison of the soul, and conceive a very exalted idea of pure spirits, hold angels to be such spirits, and explain their visible appearance by supposing that they have the power of assuming at will bodily forms and a human shape. Those who consider it no imperfection for a spirit to exist in a body, maintain that angels have bodies, but bodies of a peculiar and ethereal kind. One of the most perplexing passages in Scripture is that in the sixth chapter of Genesis, which speaks of the 'sons of God', generally regarded as referring to the angels, having intercourse with 'the daughters of men'. Some writers regard these sons of God as representing the angels spoken of by St. Jude, 'who kept not their first estate but left their own habitation', and were hence 'reserved in everlasting chains under darkness unto the judgment of the great day'. As to their names, the Catholic Church receives only three as sanctioned by the Scriptures—Michael, Gabriel, and Raphael. As is well known, Roman Catholics invoke the prayers and kind offices of angels, while Protestants (most of them at least) think this wrong.

ANGEL, a gold coin formerly current in England, so named from having the representation of an angel upon it. It weighed 4 pennyweights, and was 23½ carats fine. It had different values in different reigns, varying from 6*s.* 8*d.* to 10*s.* Angels were coined down to the Commonwealth.

ANGEL-FISH. See Monk-fish.

ANGELICA, a genus of umbelliferous plants, contains several species, one of which, *A. Archangelica* or *Archangelica officinalis*, found native on the banks of rivers and ditches in the north of Europe, was once generally cultivated as an esculent, and is still

valued for its medicinal properties. It is a biennial, from 3 to 5 feet high, with a stout, furrowed, branched stem; leaves of bright shining green, divided into numerous heart-shaped and finely-serrated lobes; white flowers in round compact umbels; ovoidal seeds, marked with longitudinal furrows; and an elongated, fleshy, branching root, black without and white within. All the parts of the plant have an agreeable smell, a saccharine, aromatic taste, and are exciting and tonic, but these properties are most active in the root. The young and tender stalks, blanched and candied with sugar, form an agreeable preserve, often seen on French tables; and the root prepared in the same way is said to be little inferior to preserved ginger. Cultivation has improved these properties, but the wild species, *A. sylvestris*, possesses them in an inferior degree. A cordial or liqueur may be prepared from the seeds.

ANGELICO, Fra. See Fiesole.

ANGELO BUONAROTTI, Michael, of the ancient family of the counts of Canossa; born 6th March, 1475, at Castel Caprese or Chiusi; one of the most distinguished names in the history of modern art, eminent alike in painting, sculpture, and architecture, and, withal, no mean poet. Domenico Ghirlandaio was his first master in the art of drawing. Before he had been with him two years, in the academy of arts established by Lorenzo de' Medici, he studied statuary under Bertoldo, and in his sixteenth year copied the head of a satyr in marble, to the admiration of all connoisseurs. He attracted no less attention as a painter, and received the honourable commission (together with the great Leonardo da Vinci) of decorating the senate-hall at Florence with historical designs. For this purpose he sketched that renowned cartoon, now long since perished, which represented a scene from the Pisan war, and is praised by critics as one of his most perfect creations. Meanwhile Pope Julius II. had invited him to Rome, and intrusted him with the charge of erecting his sepulchral monument. Twice this labour was interrupted—once by the offended pride of Michael Angelo, and then by the envy of contemporary artists. Bramante and Giuliano da San Gallo, in particular, persuaded the pope to have the dome of the Sistine chapel painted by Michael Angelo. Knowing that he had not yet attempted anything in fresco, they hoped that the imperfect execution of this task would alienate the favour of the pope from him. He declined the commission, but the pope would not be refused, and in the short space of twenty months the artist finished the work, which was admired by all connoisseurs, and of which Fernow says rightly, that it displays, perhaps more than any other of his productions, all the sublimity of his original genius. The Cappella Sistina is certainly the grandest display of art. Its perfection is owing chiefly to Michael Angelo's divine paintings. (See Sistine Chapel.) Michael Angelo was about to proceed with the monument of Julius when this pope died. His successor, Leo X., sent the artist to Florence to erect the front of the Laurentian Library. Leo, however, shortly after died, and his successor, Adrian VI., employed Michael Angelo to make the statues for the monument of Julius, particularly the renowned statue of Moses, and the Christ which was afterwards placed in the Church della Minerva at Rome. Clement VII., who next ascended the pontifical chair, recalled Michael Angelo to Rome, and charged him with the finishing of the new sacristy and the Laurentian Library at Florence. In the first, the monuments of the Medici are by him, for example, the figures of Day and Night. Tumultuous times followed, after the lapse of which he was employed to paint the Last Judgment in the Sistine Chapel. The artist, now sixty years old, unwillingly commenced a work which might endanger his fame. Naturally inclined to deep and earnest thought, preferring the sublime conceptions of Dante to all other poetry, having, by a constant study of anatomy, investigated the most secret mechanism of the muscles, and conscious of his own power, he endeavoured, in this work, to strike out a new path, and to surpass his predecessors, particularly Luca Signorelli, by a display of terrible power. The picture is grand, nay, gigantic, like the mind which created it. It represents Christ in the act of judging, or rather at the moment of condemning. Martyrs are seen, who show to the Judge of the living and dead the instruments of their torture; souls ascend to the choirs of angels hovering above; the condemned strive to break loose from the grasp of the devils; there the evil spirits burst into shouts of triumph at the sight of their prey; the lost, who are dragged down, endeavour to cling to the good, who remain in Christ's kingdom; the gulf of eternal damnation is seen opening; Jesus Christ and his mother are seen surrounded by the apostles, who place a crown on his head, and by a multitude of saints, while angels above carry in triumph the symbols of his passion; and, lower down, another company of angels sound the trumpets intended to awaken the dead from their tombs and call them to judgment. All this, and a vast deal more, is executed in the awful style of Dante. With these scenes of fear and despair, of judgment and of heavenly beatitude, a wall of great height and breadth is filled, and everywhere is displayed the most profound study, the richest experience, and the lofty spirit of a master. The effect of this picture resembles that of the sublimest passages of Dante, particularly in connection with the large images of the prophets, who, like warning and stern heralds of the last judgment, look down from the ceiling upon the spectator, resembling beings of another world rather than images made by the hand of man. Whilst this picture of the Last Judgment shows the human figure in all its attitudes and foreshortenings, and gives us the expression of astonishment, of pain, of despair, through all their degrees, it may be considered as an inexhaustible treasure for the study of the arts. Michael Angelo's last considerable works in painting were two large pictures—the Conversion of St. Paul and the Crucifixion of St. Peter in the Pauline Chapel. In sculpture he executed the Descent of Christ from the Cross, four figures of one piece of marble. It is reported of his Cupid in marble, that it was a more perfect copy of another Cupid, which he had buried in the ground, after having broken off one of its arms, in order that it might pass for an antique. This perfect Cupid is as large as life. His statue of Bacchus was thought by Raphael to possess equal perfection with the master-pieces of Phidias and Praxiteles. As late as 1546 Michael Angelo was obliged to undertake the continuation of the building of St. Peter's. He corrected its plan, for which he chose the form of the Grecian cross, and reduced to order the confusion occasioned by the various plans which had been successively pursued in the course of its construction. But he did not live long enough to see his plan executed, in which many alterations were made after his death. Besides this, he undertook the building of the Piazza del Campidoglio (Capitol), of the Farnese Palace, and of many other edifices. His style in architecture is distinguished by grandeur and boldness, and in his ornaments the untamed character of his imagination frequently appears, preferring the uncommon to the simple and elegant. His poems, which he considered merely as pastimes, contain, likewise, convincing proofs of his great genius. They are published in several collections.

but have also appeared singly. Michael Angelo died at Rome on the 17th February, 1564. It was the intention of Pope Pius IV. to have his remains interred with great pomp in the Church of the Apostles, but under the instructions of Cosmo de' Medici they were conveyed secretly to Florence, where a noble monument has been erected to his memory in the family vault of Santa Croce. Michael Angelo, though of a lofty spirit, was not haughty; he was a liberal and generous friend, but mixed little in society. He never married, but according to his own remark looked upon art as his beloved, and his productions as his children. His prose works, consisting of lectures, speeches, &c., are to be found in the collection of the Prose fiorentine, and his letters in Bottari's Lettere pittoriche. (See the Vita di Michelangelo Buonarotti scritta da Ascanio Condivi, suo Discepolo, Rome, 1553–54; Florence, 1746, fol., with addit.; and Pisa, 1823, with comments by the Cav. de Rossi; also Harford's Life of Michael Angelo Buonarotti, two vols., London, 1857.)

ANGER, an emotion of the mind produced by the receiving of some wrong, real or imagined, and which prompts the recipient to retaliate or inflict some injury on the being whose proceedings have given rise to this feeling. The effects of anger on the body are very remarkable, producing a high excitement of the arterial blood-vessels, great rapidity of the pulse, distortion of the features, and an excessive secretion of bile, and sometimes giving rise to fevers and other disorders. The milk of women under a violent fit of anger has been known to be as instantaneously fatal as a dose of strong poison. In a hygienic point of view its frequent exercise must be extremely prejudicial to the system; and therefore, from this as well as higher considerations, the happiness of each individual, with the maintenance of sound, physical, and mental health, will depend greatly on the habitual suppression of the passion of anger.

ANGERMÜNDE, a town in Prussia, in the government of Potsdam, capital of the circle of its own name, on the Lake Münde, 42 miles north-east of Berlin. It contains three churches; and has manufactures of hats, cloth, woollen stuffs, and tobacco, but the majority of the inhabitants are employed in agriculture. Pop. (1900), 7466.

ANGERS, a town and river-port of France, capital of the department of Maine-et-Loire, and formerly of the province of Anjou, in a fertile plain on the banks of the Mayenne, 150 miles south-west of Paris. It rises in the form of an amphitheatre, covering the side and summit of a hill, and consists generally of steep and narrow streets, lined by houses either built or faced with slate, and hence of so sombre a hue as to give the name of Black Angers to the town. The most remarkable buildings are the castle, in the form of a parallelogram, surrounded by high walls, flanked with eighteen large round towers, which, bulged at the top and bottom, narrowed in the middle, and formed of black slate, with intervening stripes of white, have a very singular appearance; and the cathedral, an edifice of the thirteenth century, finely situated on an eminence near the centre of the town, and flanked by two lofty spires, each 225 feet high. Angers is the seat of a bishop, and has a school of arts and manufactures; a public library with 45,000 volumes; an art gallery (the Musée) containing a large collection of fine paintings and a considerable number of the productions of the sculptor David, who was a native of this town; and an hospital founded by Henry II. of England in 1155. The manufactures consist chiefly of sail-cloth, camlet, serge, hosiery, hats, leather, refined wax, refined sugar, &c.; and the trade is chiefly in corn, wine, brandy, flax, hemp, dried fruits, &c. In the neighbourhood also are immense slate quarries, one of which, nearly 400 feet deep, occupies an area of more than 4000 yards. Angers had a university, founded in 1246, which was long one of the first seats of learning in Europe, but was destroyed at the revolution. It had also a military college, at which Lord Chatham and the Duke of Wellington received part of their education. Angers was the chief town of the Gallic tribe of the Andegavi, and received the name of Juliomagus after the conquest of Gaul by Cæsar. It was sacked and burned by the Normans in 845 and 857, and was repeatedly occupied by the English and the Bretons. In 1670, when its population amounted to 50,000, many of its wealthiest and most industrious inhabitants were Protestants. The revocation of the Edict of Nantes, by driving them into exile, deprived the town of the chief source of its prosperity. Pop. in 1906, 82,935.

ANGERSTEIN, John Julius, a distinguished patron of the fine arts, was born at St. Petersburg in 1735, and went to England in 1749 under the patronage of Andrew Thompson, a merchant, with whom he continued in partnership above fifty years. His celebrated collection of paintings was purchased after his death by the British government at the expense of £60,000 as the nucleus of a national gallery. He died at Woodlands, Blackheath, January 22, 1822.

ANGINA PECTORIS, or Heart-spasm, a disease characterized by an extremely acute constriction felt generally in the lower part of the sternum, and extending along the whole side of the chest and into the corresponding arm. The attack is usually brought on by violent exercise, excessive eating, and strong mental emotion, and is known to result in some cases from excessive tobacco smoking; when severe it is accompanied with coldness of the extremities, change of features, stoppage of the circulation, and often death, after a few hours of agony; when less severe, the patient, after a few moments of insupportable agony, is relieved from pain and regains his usual health. As lesions of the heart and the larger blood-vessels have been observed to accompany this disease, it has been supposed to be caused by them; but it is more probably a nervous affection and as such should be classed under the head *neuralgia*. The disease rarely occurs before middle age and is more frequent in men than in women. Those liable to attack must lead a quiet, temperate life, avoiding all scenes which would unduly rouse their emotions, over which they must try to obtain complete control. The first attack is occasionally fatal, but usually death occurs as the result of repeated seizures. The attacks frequently recur after slight exertion, but in aggravated cases they take place without any seeming exciting cause. The paroxysm may be relieved by opiates, or the inhalation, under due precaution, of ether, chloroform, nitrate of amyl, or other anæsthetic vapours.

ANGIOSPERMOUS (Greek, *angeion*, a vessel, and *sperma*, a seed), a botanical term applied to those phanerogamous plants whose seeds are inclosed in a pericarp. The term is now used in opposition to *gymnospermous* (*gumnos*, naked), which denotes those plants whose seeds, though sometimes protected by scales, are truly naked, fertilization taking place by the direct application of the pollen to the seed without the intervention of stigma. See Botany.

ANGLE, the mutual inclination of two straight lines; the mutual inclination of two planes; a space defined by the lines of intersection of three or more planes which have a common point. When the angle between two intersecting curves is spoken of, what is meant is the angle made by the tangents to the curves at that point. Angles are measured in degrees, minutes, and seconds, or in radians and fractions of a radian. The best known angle is a

right angle, containing 90°. The angle of an equilateral triangle is 60°. If we describe a circle with any convenient radius, and, starting from any point on the circumference, if we bend an elastic measure, of some kind, of the length of a radius to fit the curve, the lines joining the two ends of this measure with the centre will contain a radian. If we describe a quadrant of a circle and divide it into ninety parts, the two lines joining the extremities of one of these parts to the centre will contain a degree. $\frac{1}{60}$th of a degree is 1 minute, $\frac{1}{60}$th of a minute is 1 second. If we have an angle less than 90°, the angle by which it is less than 90° is called the *complement;* the angle by which any angle less than two right angles is less than two right angles is called the *supplement.* The dihedral angle, or the inclination of two planes, is measured by the angle contained between two straight lines on those planes which intersect the line of the intersection of the planes at right angles. When a solid angle is formed by the intersection of three planes it is determined by the angles contained by three right lines which meet at the point taken round in order, but when by more than three planes, we must imagine other planes introduced so as to group the faces in threes to determine the angle. The magnitudes of plane angles are expressed by their trigonometrical ratios. See TRIGONOMETRY.

ANGLER (*Lophius piscatorius*), also from its habits and appearance called *Fishing-frog* and *Sea-devil*, a remarkable fish found round our coasts, in the Mediterranean and elsewhere. It is sometimes 5 or 6 feet in length. The head is broad, rounded, and disproportionately large, and the mouth is excessively wide (whence the Scotch name of *Wide-gab*), and is furnished with a formidable array of long, strong, pointed teeth, those of the lower jaw being directed obliquely inwards; the lower jaw projects and is capable of great protrusion; on the head are long, separate, movable tendrils, one of which in particular serves to attract small fishes; the skin is soft, without scales; the pectoral fins are fleshy and supported on a bony framework, the ventral also being fitted with joints resting on a firm series of bones, so that the animal can move while lying on the ground. The angler early attracted the attention of observers, and Ælian's account of its habits shows that he was intimately acquainted with it. 'The fishing-frog,' he tells us, 'derives its name from the manner in which it employs itself. In front of its eyes there are placed some long processes, to the end of which are affixed enticing baits for the purpose of enabling it to ensnare little fishes. This toad-fish is aware of the use it may make of these organs to obtain food, and, for concealment, hides itself in some muddy place, where it keeps its body unmoved, while it lifts up and stretches out its line and bait. Little fishes that are wandering about are soon attracted and begin to nibble, which the angler is quick to perceive; and then it begins to move its line in a cautious manner, so as to lead the prey without alarming them into the gulf of its jaws, which close upon them beyond the power of escape.' But the angler cannot always obtain a sufficiency of food in this manner, and then it will rise and seize anything almost that comes in its way. One was known to swallow a cork-buoy; another got choked in attempting to swallow a gull, and a third was seen to have seized a swimming-bird, the Northern Diver. Six dozen of herrings were taken from the stomach of one, and twenty-one flounders and a dory from that of another. The angler belongs to the family Lophiadæ of the acanthopterous fishes.

ANGLES, a German tribe who appear to have originally dwelt on the east side of the Elbe between the mouth of the Saale and Ohre, and to have removed northward from their old abodes to the modern Schleswig, where they dwelt between the Jutes and Saxons. As they never approached the Rhine and the Roman frontiers we do not find their name mentioned by the Roman authors, who comprehended them, with many others, under the general name of *Chauci* and *Germani*, until the conquest of Britain made them better known as a separate nation. In the fifth century they joined their powerful northern neighbours, the Saxons, and took part in the conquest of Britain, which from them derived its future name of *England*. (See ENGLAND and ANGLO-SAXONS.) A part of them remained in their continental homes, where, to the present day, a small tract of land on the eastern coast of the Duchy of Schleswig, between the Schlei and the Gulf of Flensburg, bears the name *Angeln*.

ANGLESEY, or ANGLESEA, an island and county of England, in North Wales, in the Irish Sea, separated from the mainland by the Menai Strait. It is about 20 miles long and 17 miles broad, and has an area of 175,836 acres, of which fully 150,000 acres are under rotation crops and permanent pasture, exclusive of mountain and heath land used for pasturage (about 7600 acres). It is divided into three *cantrefs*, and each of these into two *cwmwds*, equivalent to the English hundreds. The surface of the island, with the exception of Holyhead, Parys and Bodafon Mountains, is comparatively flat, and the climate, though milder than that of the adjoining coast, is not so favourable to the growth of trees. There are no streams of any importance, but the coast affords some natural harbours, the principal of which are Holyhead and Beaumaris. The soil is various, but generally rather light and moderately fertile. By far the largest grain crop is oats, the next is barley; turnips and potatoes are grown to a considerable extent. Cattle and sheep are the staple productions of the island, and large numbers of both are annually exported. Of minerals, Anglesey contains copper, lead, and silver ore, limestone, marble, asbestos, and marl. The copper mines at Parys and Mona, once so celebrated and productive, have much decreased in value. The inhabitants carry on no manufactures of any consequence. The Menai Strait is crossed by a magnificent suspension-bridge, 580 feet between the piers and 100 feet above high-water mark, allowing the largest vessels which navigate the strait to sail under it; and also by the great Britannia Tubular Bridge, for the conveyance of railway trains, Holyhead being the point of departure for the Irish mails. The market towns are Holyhead, Beaumaris, Llangefni, and Amlwch, which formerly united in returning a member to Parliament. Holyhead is by far the largest town. The county itself returns a member to Parliament. On the coast are several small islands, the chief being Holyhead and Puffin Island. Pop. in 1891, 50,098; in 1901, 50,590.

ANGLESEY, HENRY WILLIAM PAGET, MARQUIS OF, was the eldest son of Henry, first earl of Uxbridge, and born on 17th May, 1768. He was educated at Westminster School, and Christ Church, Oxford, and in 1790 entered Parliament as member for the Carnarvon boroughs. In 1793 he entered the army as lieutenant-colonel of the 80th Foot—a regiment which he himself had raised from his father's tenantry, and which was, previous to its incorporation with the line, known by the name of the Staffordshire Volunteers. In 1794 he joined the army in Flanders, and greatly distinguished himself in the campaign under the Duke of York. On his return to England he was transferred to the command of a cavalry regiment, and in that capacity accompanied the Duke of York to Holland in 1799, where he again made himself conspicuous by his military abilities. In 1808 he

was sent into Spain with two brigades of cavalry to join the army of Sir John Moore, and in the retreat of that general to Coruña had the honour of commanding the rear-guard. He also contributed effectually to the successful issue of the battle of Coruña. In 1809 Lord Paget returned to England, and in 1812 he succeeded, by his father's death, to the title of Earl of Uxbridge. On the arrival of Napoleon in France from Elba he was appointed commander of the cavalry of the British army, accompanied it to Belgium, and at the battle of Waterloo, by the charge of the heavy brigade under his leadership, overthrew the celebrated Imperial Guard. Towards the close of the engagement he was struck in the knee by a ball, which rendered necessary the amputation of his leg. In consideration of the distinguished services rendered by him at Waterloo Lord Uxbridge received the title of Marquis of Anglesey, and was nominated a Knight Grand-cross of the order of the Bath, besides receiving various honours from the allied European sovereigns. On the accession of Canning to the premiership in 1827 the Marquis of Anglesey took office as master-general of the ordnance, but resigned it the following year for the lord-lieutenancy of Ireland under the Duke of Wellington's ministry. In this capacity he made himself extremely popular, but was shortly recalled in consequence of the views expressed by him in favour of Catholic emancipation. He again became Lord-lieutenant of Ireland under Earl Grey in 1830, but quitted office in 1833 on the earl's resignation. From this period he took little part in politics till 1846, when he again became master-general of the ordnance under the Russell ministry, retaining that office till Lord Derby became premier in 1852. He died on 29th April, 1854.

ANGLICAN CHURCH, a term which strictly embraces only the Church of England and the Protestant episcopal churches of Ireland, Scotland, and the colonies, though the episcopal churches of the United States are sometimes included under it. All these churches are similar in doctrines and ritual, as exhibited in the Book of Common Prayer, though there is room in each for considerable divergence both in ritual and belief. See ENGLAND—Church.

ANGLING, the art of ensnaring fish with a hook baited with small fish, worms, flies, &c. We find occasional allusions to this pursuit among the Greek and Latin classical writers; it is mentioned several times in the Old Testament, and it was practised by the ancient Egyptians. The oldest printed work on the subject in English is the Treatyse of Fysshinge with an Angle, which was printed by Wynkyn de Worde in 1496 in one volume, with treatises on hunting and hawking, the whole being ascribed to Dame Juliana Berners or Barnes, prioress of a nunnery near St. Albans. Walton's inimitable discourse on angling was first printed in 1653. This edition and three subsequent ones consisted wholly of what is now called part the first of the Complete Angler, being Walton's individual portion of the work.

The chief appliances required by an angler are a rod and a line. Rods are made of various materials. The cane rods are lightest; and where fishing-tackle is sold they most commonly have the preference; but in retired country places the rod is often of the angler's own manufacture. Salmon rods are sometimes wholly made of ash, with a whalebone top. Other rods may be formed thus:—A yellow deal joint of 7 feet; a straight hazel joint of 6 feet; a piece of fine-grained yew, tapered to a whalebone top, and measuring together about 2 feet. The *reel*, an apparatus for winding up the line, is attached to the rod near the place where the hand grasps it while fishing. The best are usually made of brass, are of simple construction, and so made as to wind or unwind freely and rapidly. That part of the line which passes along the rod and is wound on the reel is called the *reel line*, and may vary from 20 to 100 yards in length, according to the size of the water and the habits of the fish angled for; it is usually made of twisted horse hair and silk, or of oiled silk alone. The casting line, which is attached to this, is made of the same materials, but lighter and finer. To the end of this is tied a piece of fine gut, on which the hooks are fixed. The casting and gut lines should decrease in thickness from the reel line to the hooks. The hook should readily bend without breaking, and yet retain a sharp point, which may be occasionally renewed by a whetstone. It should be long in the shank and deep in the bend; the point straight, and true to the level of the shank; and the barb long. Their sizes and sorts must of course entirely depend on the kind of fish that are angled for. Floats formed of cork, porcupine quills, goose and swan quills, &c., are often used to buoy up the hook so that it may float clear of the bottom. For heavy fish or strong streams a cork float is used; in slow water and for lighter fish quill floats. To make the former take a sound common cork and bore it with a small red-hot iron through the centre lengthways; then taper it down across the grain about two-thirds of the length and round the top, forming it, as a whole, into the shape of a pear. Load the floats so as just to sink them short of the top.

The following are the chief fish taken by anglers in Great Britain:—The *Barbel* is a heavy, dull fish, and gives very inferior sport to the angler in proportion to his size and strength. They begin to shed their spawn about the middle of April, and come in season about a month or six weeks after. The most killing baits for the barbel are the spawn of trout, salmon, or other fish, or pastes made to imitate it. It is advisable to bait the water over-night by spawn or a quantity of cut worms. The barbel will also bite well at the cobworm, gentles (maggots), and cheese, soaked in honey. The rod and line used must both be extremely long, with a running plummet attached to the latter, as the fish swim very close to the bottom. By a gentle inclination of the rod you may easily ascertain when there is a bite, immediately upon which the fish should be struck; that is, the rod should be quickly jerked with the wrist so as to fix the hook in the fish's mouth; he seldom escapes then, unless he breaks the line. The *Bleak* or *Blay* is a common river fish that spawns in March, and is fond of many of the baits for trout. It is usually caught with a small artificial fly of a brown colour, and the hook should be suited in size to the fly. *Bream* shed their spawn about midsummer, and although they are occasionally met with in slow-running rivers are reckoned a pond-fish, where they will thrive in the greatest perfection. In fishing for them the angler should take all possible care to keep concealed from the fish, which are angled for near the bottom. His tackle also must be strong. *Carp* spawn three or four times a year, but the earliest time is about the commencement of May. In angling for carp it is necessary to make use of strong tackle, with a fine gut next the hook, and a float formed of the quill of a goose. They bite almost close to the bottom, and are rarely caught if angled for in a boat. The pond-carp loves a rich and fat soil, and will seldom or never thrive in cold hungry waters. *Tench*, like the carp, are generally considered pond-fish, although they are also frequently caught in slow-running rivers. They shed their spawn about the commencement of July, and are in season from September

to the latter end of May. They will bite very freely during the sultry months. Their haunts are similar to those of the carp, except that they frequent the foulest and muddiest bottoms, where they may shelter themselves among an infinite quantity of reeds; hence you must angle for them very near the bottom, and allow them sufficient time to gorge the bait. The *Chub* or *Chevin* is, like the perch, a very bold biter, and will rise eagerly at a natural or artificial fly. They spawn in June or at the latter end of May, at which time they are easily caught by a fly, a beetle with his legs and wings cut off, or still more successfully by a large snail. When they are fished for at mid-water or at bottom a float should be made use of; when at top, it is customary to dip for them, or to use a fly, as if a trout were the angler's object. Strong tackle is also requisite, as they are a heavy fish, and usually require a landing-net to pull them out. Their average length is from 10 to 14 inches. *Dace, Dart,* or *Dare* are very active and cautious, and rise to a fly either real or artificial. They spawn in February and March, and their flesh is but inferior in point of flavour. They frequent gravelly, clayey, and sandy bottoms, leaves of the water-lily, and deep holes, if well shaded. In sultry weather they are frequently caught in the shallows, and during that period are best taken with grasshoppers or gentles. In fishing at bottom for roach and dace, which are similar in their haunts and disposition, bread soaked in water and kneaded to a good consistency, and then made up, together with bran, into round balls, and thrown into the place where it is proposed to angle, will be found very serviceable, but must always be thrown up the stream. The *Eel* is rarely angled for, but it is usually caught by the process of sniggling or bobbing, with night lines, &c. All who expect much sport in eel-fishing must devote their evenings, and even whole nights, to the pursuit. The method of sniggling is as follows:—Take a common needle, attached in the middle by unwaxed twine to a pack-thread line, or a strong small hook fixed to this kind of line; place a large lobworm, by the head end, on your needle or hook, and draw him on to his middle; affix another needle to the end of a long stick, and guide your bait with it into any of the known haunts of the fish, between mill-boards, or into clefts of banks or holes, holding the line in your hand; now give the eel time to gorge the bait, and then by a sharp twitch fix the needle across his throat, or the hook into his body; tire him well, and your triumph is certain. Eels bite in a shower and in windy gloomy weather at the lob and garden worm, designed for other fish, particularly trout. They are a very greedy fish, and if you wish to angle for them in the ordinary way they will take a lamprey, wasp grubs, minnows, &c., but particularly the first. The *Grayling* or *Umber* spawns in May, and is in the best condition in November. They will greedily take all the baits that a trout does, and frequent the same kind of streams, but occur in few streams in comparison. They must be angled for with very fine tackle, as they are a remarkably timid fish. When hooked they must also be cautiously worked, as the hold in their mouth easily gives way; but they will speedily return to the bait. The *Gudgeon* is a fish in some request, both for its flavour and the sport it affords to the inexperienced angler. It is allured with almost any kind of bait. It spawns two or three times during the year, and is fond of gentle streams with a gravelly bottom. In angling for gudgeon the bottom should be previously stirred up, as this rouses them from a state of inactivity, and collects them in shoals. Some anglers use two or three hooks in gudgeon-fishing. A float is always used, but the fish should not be struck on the first motion of it, as they are accustomed to nibble the bait before they swallow it. The *Loach* or *Groundling* sheds its spawn in April, and remains in the gravel, where they are usually caught with a small red worm. *Minnows* spawn generally about once in two or three years, and swim together in shoals, in shallow waters, where they are very free and bold in biting. They serve as excellent baits for pike, salmon, trout, chub, perch, and many other fish. The *Perch* is a very bold biting fish, and affords excellent amusement to the angler; they spawn about the beginning of March. In fishing for perch with a minnow or brandling the hook should be run through the back fin of the bait, which must hang about 6 inches from the ground. A large cork-float should be attached to the line, which should be leaded about 9 inches from the hook. It must be observed that they invariably refuse a fly. The *Pike* or *Jack* is a fish of the greatest voracity. Their usual time of shedding their spawn is about March, in extremely shallow waters. The finest pike are those which feed in clear rivers, those of fens or meres being of very inferior quality. They are usually taken by spinning or live baiting, the bait in either case consisting of a small fish, such as a trout or dace. The former method receives its name from the bait being so disposed on several hooks as to revolve rapidly when the line is drawn quickly through the water, this having the effect of attracting the fish. *Roach* are frequently taken with flies under water. They will bite at all the baits which are prepared for chub or dace. They spawn in May, and turn red when boiled. In angling for roach the tackle must be strong, and the float large and well leaded. The *Salmon* is one of the angler's finest prizes, affording excellent sport. It is partly a fresh-water partly a salt-water fish, its spawn being always deposited in the fresh water. The spawning season is from the end of autumn to the beginning of spring, but differs much in different rivers, and in some continues to the beginning of summer. The most ordinary time for spawning, however, is from the middle of November to the following January. This is the time when they require to be specially protected, and accordingly a close time has been established by law, during which they are not to be caught. (See SALMON.) The length of the rod for catching salmon should be from about 17 to 20 feet, which, however, can be regulated according to the breadth and general size of the river in which the angler pursues his operations. The line may be composed either of strong silk or twisted horse-hair, gradually diminishing towards the top, and having a loop at the end, while the casting-line also has a loop, to fasten them to each other. Let this last line be very carefully twisted with the fingers, and shorter than the rod, so that none of the knots may come within the top ring; sixteen to twenty horse-hairs may be used in the upper links, but they must be diminished toward the hook, where they are best made of three small round twisted silkworm guts or a few strong horse-hairs. All large and gaudy natural flies, particularly the dragon-fly and may-fly, have been used with great success. The artificial ones should be generally of large dimensions, and of a gaudy and glittering colour. The materials that compose them are hairs, furs, and wools, of every variety that can be collected, mingled with the tail-feathers of cocks and game, and secured together by plated wire or gold and silver thread, marking silk, shoemaker's wax, bees'-wax, &c. Their wings may be made of the feathers of domestic fowls, or any others of a showy colour. Imitate principally the natural flies recommended; but you may safely indulge your

fancy rather than depart without a bite, for many anglers succeed with the most monstrous and capricious baits of this kind. A raw cockle or mussel, prawns, and minnows have also been recommended as salmon baits. The mode of angling with these is to drop the line into some shallow which approximates to the edge of a hole of considerable depth, and in this situation to suffer it to be carried in by the current. Roe is a deadly bait, but is prohibited by law. The novice in angling will at first experience considerable difficulty in throwing his line to any great extent. For this we can give no recipe but a most inflexible determination to succeed, and the most consummate patience in disappointment. It should always be thrown across the river, and on the off-side from the spot where you expect the fish to rise. When you imagine that the salmon has been struck be cautious in giving him time sufficient to enable him to pouch his bait, that is, to swallow it fairly and securely. After this fix the hook firmly in him by a gentle twitch. On the first sensation of this pain the salmon will plunge and spring with great violence, and use every endeavour of strength and cunning to effect his escape. He will then perhaps run away with a considerable length of line, which is to be kept in a gently relaxed situation, so that it may always yield with facility to his obstinate resistance; nor can you give him too much line, if you do but clear it of weeds and encumbrances. If he now become sullen and lie quiet in the water rouse him gently by flinging in a few stones, and when he once more commences resistance do not be too eager in checking his career, but let him gradually exhaust himself of his strength; follow him down the stream or allow him to cross it, while at every opportunity you keep winding up your line until you approach him in this wearied state, and take him softly by the gills out of the water. Strong fish sometimes escape, however, and one was known to get off after being played for twenty-three hours by three different anglers in succession. The larger fish are often landed by means of the landing-net or the *gaff* (a steel hook attached to a wooden handle), these implements being used by the angler's attendant. *Trout* are considered as one of the finest river fish that this country can produce. They abound in the generality of our streams, rivers, and lakes, and are usually angled for with an artificial fly. They are very voracious, and by their activity and eagerness afford the finest sport to the angler. In streams that have been much fished they become extremely wary, and much skill is required on the part of the angler. Their general time of shedding their spawn is about October or November; in some rivers, however, it is much sooner, in others later. They are often met with in eddies, where they remain concealed from observation behind a stone, or log, or a bank that projects into the stream; during the latter part of the summer they are frequently caught in a mill-tail, and sometimes under the hollow of a bank or the roots of a tree. In angling for trout there are many things worthy of particular observation: 1st. That the day on which the sport is undertaken be a little windy or partially overcast, and the south wind is superior to all others, if it do not too much disturb your tackle. 2d. The sportsman should remain as far as possible from the stream, fish it downwards, the line never touching the water, as the agitation proceeding from the fall might disturb the fish, and preclude all possibility of capturing them. 3d. Clear streams are famous for sport, and in fishing in them a small fly with slender wings must be attached to the hook. When the water is thick, and the sight more imperfect from this disadvantage, a larger species of bait must of necessity be used. 4th. The line should, on an average, be about twice as long as the rod, unless in cases of emergency, when the number and variety of trees exclude the probability of a successful throw, if at any distance. 5th. Let the fly be made to suit the season. The natural fly may be used, and often with good effect. 'Dry-fly' fishing is a method introduced in recent times. In this case the fly is cast so as to float along on the surface of the water. Trout are the commonest freshwater fish in Britain, being found everywhere, and in very small streams. They seldom grow larger than to weigh a pound or two, though fish much larger than this have sometimes been found. The great lake trout, a different species from the common trout, has been known to weigh 30 lbs. With proper tackle a persevering angler is almost certain to obtain specimens of this fish weighing 10 to 20 lbs. in Loch Awe, which contains the largest trout in the kingdom. If hooked upon tackle of moderate strength they afford excellent sport. The ordinary method of fishing for this king of trouts is with a powerful rod, from a boat rowing at the rate of from 3 to 4 miles an hour; the lure, a common trout, from 3 to 10 inches in length, baited upon six or eight salmon hooks, tied back to back upon strong gimp, assisted by two swivels, and the reel-line strong whip-cord. Yet all this, in the first impetuous efforts of the fish to regain its liberty, is frequently carried away for ever into the crystal depths of Loch Awe!

ANGLO-SAXONS, the name used, with doubtful propriety, by modern historians to include the Angles, Saxons, and Jutes, who settled in Britain in the fifth and sixth centuries after Christ, and thus became the ancestors of the English people. These tribes came from Germany, where they inhabited the parts about the mouths of the Elbe and Weser, and the first body of them who gained a footing in this country are said to have landed in 449, and to have been led by Hengist and Horsa. The Jutes settled chiefly in Kent, the Saxons in the south and middle of the country, and the Angles in the north. Among the various Anglo-Saxon states that afterwards arose those founded by the Angles first gained the preponderance, and the whole country came in time to be called after them *Engla-land*, that is, the land of the Angles. As an outline of Anglo-Saxon history will be found in the article ENGLAND, we shall here confine ourselves to giving some particulars regarding the institutions and customs of the Anglo-Saxons.

Among them we find the English constitution already existing in all its essentials, but its origin is not to be attributed to Alfred, as is sometimes done, though he restored it, and brought it to a greater pitch of completeness. In a rudimentary form it was the common property of the Germanic peoples before the emigration of the Saxons and Angles from the Continent. It developed itself more independently, however, among the Anglo-Saxons than among those Teutonic races who came into closer connection with the Romans, and afterwards with the Romish hierarchy. The whole Anglo-Saxon community was frequently spoken of as consisting of the *eorls* and the *ceorls*, or the nobles and common freemen. The former were the men of property and position, and were themselves divided into different ranks; the latter were the small landholders, handicraftsmen, &c., who generally placed themselves under the protection of some nobleman, who was hence termed their *hlaford* or lord. Besides these there was the class of the serfs or slaves (*theowas*), who might be either born slaves or freemen who had forfeited their liberty by their crimes, or whom poverty or the fortune of war had brought into this position. They served as agricultural labourers on their masters' estates, and though they were mere chattels, as

absolutely the property of their master as his cattle, their lot does not appear to have been very uncomfortable. They were frequently manumitted by the will of their master at his death, and were also allowed to accumulate savings of their own, so as to be able to purchase their freedom or that of their children. One of the peculiar features of Anglo-Saxon society was the *wergyld*, or life-price, which was established for the settling of feuds. 'A sum, paid either in kind or in money where money existed, was placed upon the life of every freeman, according to his rank in the state, his birth, or his office. A corresponding sum was settled for every wound that could be inflicted upon his person; for nearly every injury that could be done to his civil rights, his honour, or his domestic peace; and further fines were appointed according to the peculiar adventitious circumstances that might appear to aggravate or extenuate the offence. From the operation of this principle no one was exempt, and the king as well as the peasant was protected by a wergyld, payable to his kinsmen and his people' (Kemble, Saxons in England). The king (*cyning*, *cyng*) was at the head of the state; he was the highest of the nobles and the chief magistrate. He was not looked upon as ruling by any divine right, but by the will of the people, as represented by the *witan* or great council of the nation. Accordingly we find that the new king was not always the direct and nearest heir of the late king, but one of the royal family whose abilities and character recommended him for the office. The king was invested with certain honours and privileges in order that he might maintain his position with becoming dignity. Besides his wergyld as an ætheling or person of royal blood, his life was further guarded by a sum of equal amount, called *cynebót* or price of royalty, and the former sum was to be paid to his relations, the latter to the people. As king he held possession of the crown lands, which were national property, and distinct from any private estates he might himself purchase. Among other privileges he was entitled to a portion of the fines and confiscations laid upon offenders; he had the right of maintaining a standing army of household troops, the duty of calling together the council of the witan, and of laying before them measures which concerned the welfare of the state, with certain distinctions of dress, dwelling, &c., all his privileges being possessed and exercised by the advice and consent of the *witena-gemót* or parliament. The queen also was held in high honour. She sat on a throne by the king in the assemblies, and she possessed a separate establishment from that of the king, though on a smaller scale. Next in rank and dignity to the king were the *ealdormen*. These were at the head of the administration of justice in the shires, possessing both judicial and executive authority, and had as their officers the *scír-geréfan* or sheriffs. One of their most important functions was the leading of the armed force of the county, a duty which often fell to their share during the period of the Danish invasions. The ealdorman, as such, held possession of certain lands attached to the office, and he was also entitled to a share of fines and other monies levied for the king's use and passing through his hands. 'Thus the position which his nobility, his power, and his wealth secured to the ealdorman was a brilliant one. In fact, the whole executive government may be considered as a great aristocratical association, of which the ealdormen were the members, and the king little more than the president. They were in nearly every respect his equals, and possessed the right of intermarriage with him; it was solely with their consent that he could be elected or appointed to the crown, and by their support, co-operation, and alliance that he was maintained there. Without their concurrence and assent, their license and permission, he could not make, abrogate, or alter laws; they were the principal witan or counsellors, the leaders of the great gemót or national inquest, the guardians, upholders, and regulators of that aristocratical power of which he was the ultimate representative and head' (Kemble, vol. ii. p. 142). Under the Danish kings the ealdorman fell into a subordinate position, and the eorl or earl took his place in the county. The ealdorman and the king were both surrounded by a number of followers called *thegns* or thanes, who were bound by close ties to their superior. The king's thanes were the higher in rank, and formed a kind of nobility by themselves. They possessed a certain quantity of land, smaller in amount than that of an ealdorman, and they filled offices connected with the personal service of the king or with the administration of justice. According to Lappenberg they were in all respects the predecessors of the Norman barons. We frequently hear of a class of functionaries called *geréfan* or reeves, such as the *scír-geréfa* (shire-reeve or sheriff), the *port-geréfa* (port-reeve), the *tun-geréfa* (farm-reeve or bailiff; Scotch, *grieve*). These, of course, had different duties to perform, those of the shire-reeve being the most important. He presided at the county-court along with the ealdorman and bishop, or alone in their absence; and he had to carry out the decisions of the court, to levy fines, collect taxes, &c. In virtue of his office he had a portion of land allotted to him, and hence called reeve-land. The shires were divided into hundreds and tithings, the former being equal to ten of the latter. The tithing consisted of ten heads of families, who were jointly responsible to the state for the good conduct of any member of their body. For the trial and settlement of minor causes there was a hundred court held once a month. The place of our modern parliament was held by the *witena-gemót*, the representative council of the nation. Its members, who were not elected, comprised the æthelings or princes of the blood royal, the bishops and abbots, the ealdormen, the thanes, the sheriffs, &c.

Agriculture, including especially the raising of cattle, sheep, and swine, was the chief occupation of the Anglo-Saxons. Large tracts of the marshy land in the east of England were embanked and drained by them, and brought into cultivation. Gardens and orchards are frequently mentioned, and vineyards were common in the southern counties. The forests were extensive, and valuable both from the mast they produced for the swine, and from the beasts of the chase which they harboured. Hunting was a favourite recreation among the higher ranks, both lay and clerical. Fishing was largely carried on, herrings and salmon being the principal fish caught. The whale-fishery was also pursued, when the Anglo-Saxon vessels used to go as far as Iceland. The manufactures were naturally of small moment. Iron was made to some extent, and some cloth, and salt-works were numerous. In embroidery and working in gold, however, the English were famous over the Continent, and some very elegant specimens of gold work have come down to our times. There was already a considerable trade at London, which was frequented by Normans, French, Flemings, and the merchants of the Hanse towns. Our Anglo-Saxon forefathers were notorious for their excessive fondness for eating and drinking, and in this respect formed a strong contrast to the Normans who invaded the country. Ale, mead, and cider were the common beverages, wine being limited to the higher classes. Pork was a favourite article of food, and so were eels, which were kept and fattened in eel-ponds, and sometimes paid as rent. The houses were rude,

ill-built structures, mostly of wood and without proper chimneys, but were often richly furnished and hung with fine tapestry. The dress of the Anglo-Saxons was loose and flowing, the materials being linen, woollen, and also silk; and their garments were often adorned with embroidery. The men looked upon the hair as one of their chief ornaments, and wore it long and flowing over their shoulders, while they also usually wore beards. Both sexes were fond of wearing gold and silver ornaments.

Christianity was introduced among the Anglo-Saxons in the end of the sixth century by St. Augustine, who was sent by Pope Gregory the Great, and became the first Archbishop of Canterbury. Kent, then under King Ethelred, was the first place where it took root, and thence it soon spread over the rest of the country. It must, of course, be remembered that the Britons and Scots had already embraced Christianity, and missionaries from these laboured in the conversion of the Anglo-Saxons. Monasteries were founded at an early period and became numerous. For a time the Anglo-Saxon Church remained independent of Rome, notwithstanding the continual efforts of the popes to bring it under their power. (See ENGLAND—section on ecclesiastical history.) Many Anglo-Saxon ecclesiastics were distinguished for learning and ability, but the Venerable Bede holds the first place. St. Boniface, the apostle of Christianity to the Germans, was an Anglo-Saxon. (See Palgrave's Rise and Progress of the English Commonwealth; Lappenberg's England under the Anglo-Saxon Kings; Kemble's Saxons in England; Freeman's History of the Norman Conquest and his Old English History; J. R. Green's Making of England and his Conquest of England; Grant Allen's Anglo-Saxon Britain; Sir J. H. Ramsay's Foundations of England; &c.).

Anglo-Saxon Language.—The Anglo-Saxon language, the parent or earliest form of our modern English, is a member of the Teutonic class of languages, and belongs to the Low German, as distinguished from the High German and Scandinavian branches of those languages. It was not called Anglo-Saxon by those who spoke it, but English (*Englisc*), and many condemn the former name as a misnomer, and tending to mislead. It is now common to call Anglo-Saxon Old English, which indeed it is, but the former designation is employed by the best scholars, both British and foreign; and as one point in its favour we may state that the language in its earliest form is so different from modern English that even by an Englishman it has to be studied as a foreign tongue, like German or Icelandic. Besides the Anglo-Saxon, other Low German dialects formerly spoken were the Mœso-Gothic, as we find it in Ulfilas's translation of the Gospels, a dialect which has left no lineal descendants; the Old Friesic, once spoken extensively between the mouths of the Rhine and Elbe, and now represented by the modern Friesian and the Dutch; and the Old Saxon. To all these Anglo-Saxon was more or less closely allied, as English is to their descendants at the present day. To any one who intends to investigate the English language scientifically and thoroughly the study of all the Teutonic tongues is of the utmost importance. The tribes that came from North Germany to Britain spoke several different dialects, and though some of these would no doubt coalesce in time, we find in the existing remains of Anglo-Saxon literature three different dialects at least, a northern, a middle, and a southern. The northern and the southern were the principal. The former was spoken in the north, where the Angles chiefly settled, and where numbers of Danes afterwards established themselves, and consequently it shows a considerable intermixture of Danish elements; the latter prevailed in the Saxon settlements of the south, and is more nearly akin to the old Friesic and Old Dutch dialects. When the Kingdom of Wessex acquired political and ecclesiastical supremacy over the others, early in the ninth century, the dialect of Wessex came into vogue as the language of literature and of the court, and so continued. The principal Anglo-Saxon literary remains are in this dialect. The Anglo-Saxon alphabet, as regards the forms of its letters, followed the Latin alphabet as modified in certain ways, with the addition of one or two characters of runic origin. It had two special characters for *th*, the one answering to soft *th*, as in *thy*, the other to hard *th*, as *thing* (but they were not uniformly used in this distinctive way), and a special character for *w*. The letter *k* was little used (and *q* still less), *c* having always this sound. There was no *j*, *sh*, or *v* in the alphabet. Nouns and adjectives were declined much as in German or in Latin, thus—nominative, *wulf*, a wolf; genitive, *wulfes*, of a wolf; dative, *wulfe*, to a wolf; accusative and vocative, *wulf*; instrumental or ablative, *wulfe*, with or by a wolf; plural, nominative, *wulfas*, wolves; genitive, *wulfa*; dative, *wulfum*; accusative and vocative, *wulfas*; instrumental, *wulfum*. There were several declensions. The adjective had different forms for the three genders, for the two numbers, and for four cases; and so had the article and the pronoun. The adjective had two modes of declension, according as it stood alone with a noun or was preceded by the article or a pronoun also agreeing with the noun. With regard to the pronouns, the most remarkable fact is that those of the first and second person had a dual number, 'we two' or 'us two' and 'you two', besides the plural for more than two. The infinitive of the verb is in *an*, and there is a gerund similar in its usage to the Latin gerund. The present indicative of the verb *wesan*, to be, is thus conjugated:—Singular, 1, *eom*, 2, *eart*, 3, *is*; plural, 1, 2, and 3, *synd* (or *syndon*). The indicative present of *lufian*, to love, is—singular, 1, *lufige*, 2, *lufast*, 3, *lufath*; plural, 1, 2, and 3, *lufiath*; past tense, *lufode*, *lufodest*, *lufode*; plural, *lufodon*. The verb had four moods—indicative, subjunctive, imperative, and infinitive, but only two tenses, the present or indefinite and the past. Other tenses and the passive voice were formed by auxiliary verbs. There was no future tense, the present being used instead, and whether the meaning was future or not had to be gathered from the context.

Anglo-Saxon words terminated in a vowel much more frequently than the modern English, and thus the language must have been much more sonorous and full-toned, but the correct pronunciation of Anglo-Saxon words is a matter of some uncertainty. The final *a*, *e*, *o*, and *u*, which were so common in Anglo-Saxon, were afterwards softened to *e*, which latterly fell away or remained silent, as the language gradually assumed the form used in speaking and writing at the present day. The large number of words of Latin origin that our language contains, and great numbers of which were introduced through the Norman-French, does not prevent English from being essentially a Teutonic language. The bone and sinew, the framework of the language, so to speak, is still Anglo-Saxon, and a conversation could be carried on and pages written without having recourse to words of any other origin. Many chapters of the New Testament do not contain more than 4 per cent of alien words, and as a whole it averages perhaps 6 or 7. If we examine to what classes belong the words of Teutonic origin, we shall see how indispensably necessary they are to us, and how they form the groundwork of our mother tongue.

The articles, pronouns, conjunctions, prepositions, auxiliary verbs, and the numerals up to but exclusive of *million*, are all Anglo-Saxon. Classing the words by their meanings, we find that the names of the organs and members of the body and their functions, such as foot, hand, tooth, hair, eat, drink, walk, &c.; the names of common natural objects and phenomena, sun, moon, stars, land, water, field, wood, tree, thunder, lightning, wind, rain; expressions for the ordinary kinds of feeling and affection, for the outward signs of these, and for the persons who are the earliest and most natural objects of our attachment, as hope, fear, hate, love, gladness, sorrow, smile, tear, father, mother, sister, brother, wife, child, home, hearth, fireside, &c.; the language of the common people and of everyday occupations; and 'a very large proportion of the language of invective, humour, satire, and colloquial pleasantry', is Anglo-Saxon. It must also be remarked that though abstract words are generally derived from the Latin, those whose signification is specific are generally Anglo-Saxon. The general term *motion*, for instance, is Latin, but particular acts of motion, as walk, run, ride, crawl, creep, fly, are Teutonic; and so with the general word *colour*, and red, white, blue, green, the individual colours. (For the student of Anglo-Saxon we may recommend Bosworth's Anglo-Saxon Dictionary, as edited and remodelled by Prof. Toller; Sweet's Student's Dictionary of Anglo-Saxon; Hall's Concise Anglo-Saxon Dictionary; Sievers' Old English Grammar (as translated and edited by Prof. A. S. Cook); Prof. March's Comparative Grammar of Anglo-Saxon; Sweet's Anglo-Saxon Reader in Prose and Verse (with grammar prefixed); &c.)

Anglo-Saxon Literature.—The existing remains of Anglo-Saxon literature (a large proportion of which has been printed only in recent times) include numerous compositions in prose and verse, some of which must be referred to a very early period. The longest and most important poem is the Tale of Beowulf, which, from internal evidence, must have been composed before the Angles and Saxons emigrated to England, though it afterwards received considerable modifications on English soil. It extends to more than 3000 lines (each of which in some editions is printed as two). Its hero Beowulf is a Scandinavian prince, famed for strength and valour, who slays a fiendish or demonic cannibal (Grendel) and his equally formidable mother—having sought the latter in her mysterious abode beneath the waters of a mere—and is at last slain in a contest with a frightful fire-breathing dragon. It presents a spirited and picturesque series of semi-romantic scenes and incidents, curiously illustrative of early Teutonic manners and superstitions, and its scene appears to be laid entirely in Scandinavia. The Anglo-Saxon poetical remains have been divided into the ballad epic, of which Beowulf is the principal example; the Bible epic, to which belong the poems of Cædmon and some others; ecclesiastical narratives, as lives of saints and martyrs, &c.; psalms and hymns; secular lyrics; allegories, gnomes, riddles, &c. The religious class of poems was the largest, and of these Cædmon's are the most remarkable. He wrote in the latter half of the seventh century, and died about 680. He was originally a poor ignorant hind in the service of the monks of Whitby, and his poetical faculties are said to have been roused in a miraculous manner by a dream. His poems consist of loose versions of considerable portions of the Bible history, and in subject and thought sometimes bear a far-off resemblance to Milton's Paradise Lost. They sing of the creation, the temptation, the fall, the exodus of the Israelites, the story of Daniel, the incarnation of Christ, the rage and despair of Satan and the devils in consequence, and the harrowing of hell, or release of the ransomed souls by Christ. It is probable that the language of the poems as we possess them has been modernized from the language of the writer. We present the reader with the opening lines of the Genesis, as a specimen of his poems and of the Anglo-Saxon poetry in general:—

'Nu we sceolon herian heofonrices Weard,
Metodes mihte and his modgethonc,
wera Wuldorfæder, swa he wundra gehwæs,
ece Dryhten, ord onstealde.
He ærest gesceop eorthan bearnum
heofon to hrofe, halig Scyppend;
tha middangeard, moncynnes Weard,
ece Dryhten, æfter teode
firum foldan, Frea ælmihtig.'

That is:—'Now we shall (let us) laud heaven-realm's Ward (guardian), the Creator's might and his mood-thought, of men the-glorious-Father: how he, of wonders each, eternal Lord, the beginning established. He first shaped for earth's children heaven as a roof, holy Shaper (Creator), then mid-earth, mankind's Ward, eternal Lord, afterward created, for-men a world, Master almighty.'

Cynewulf is another poet of whose works we possess several specimens, but of whom little or nothing is known. Grein's Bibliothek der Angelsächsischen Poesie (new edition by Wülker) contains the Anglo-Saxon poetry complete.

Rhyme was rarely used in Anglo-Saxon poetry, alliteration being employed instead, as in the older northern poetry generally. The nature of the alliteration will be seen from the above extract, in which each line (or couplet) has two or more words beginning with the same letter or sound. (See also ALLITERATION.) The style of the poetry is highly elliptical, and it is full of harsh inversions and obscure metaphors.

The Anglo-Saxon prose remains consist of translations of portions of the Bible, homilies, moral treatises, history, biography, laws, leases, charters, popular treatises on science and medicine, grammars, &c. Many of these were translations from the Latin. The uses to which prose was applied were generally of a practical cast, and the common language of the people was used (as in charters and leases) when in other countries at the same period nothing but Latin would have been employed. The Anglo-Saxon versions of the Gospels, next to the Mœso-Gothic, are the earliest scriptural translations in any modern language. The Psalms are said to have been translated by Bishop Aldhelm, and also under Alfred's direction, and the Gospel of St. John by Bede, but it is not known who were the authors of the extant versions. A translation of the first seven books of the Bible is believed to have been the work of Ælfric, who was Archbishop of Canterbury at the close of the tenth century, and did much to diffuse knowledge among his countrymen. We have also a collection of eighty homilies from his pen, several theological treatises, a Latin grammar, &c. King Alfred was a diligent translator of Latin works. He was more than a translator, however, as he often adds to his author passages of his own, either containing valuable facts or apt comments on his text. We have under his name translations of Bœthius De Consolatione Philosophiæ, the Universal History of Orosius, Bede's Ecclesiastical History, the Pastoral Care of Gregory the Great, &c. Among his works are an account of Germany as it existed at his time, and of the voyage of Wulfstan and Ohthere, two Northmen, both of which are inserted in his translation of Orosius. The most valuable to us of the Anglo-Saxon prose writings is the Saxon Chronicle, as it is called, a collection of historical records made in different religious houses. A chronicle was kept at the monasteries in Alfred's

time, and it has been supposed that this was done by his direction. The Chronicle has been often printed. Mr. Thorpe's edition (1861) contains seven parallel texts, and a translation. The latest text comes down to 1154. A considerable body of laws remains, which have been repeatedly printed. The editions of Thorpe and of Schmid (with Latin and German translation, notes, and a glossary) are the best. A large collection of charters is embraced in Mr. Birch's Cartularium Saxonicum, and a mass of documents of the same kind, with leases, ecclesiastical constitutions, wills, &c., is contained in Kemble's Index Diplomaticus Ævi Saxonici.

ANGOLA, a country on the Atlantic coast of Africa, south of the Congo, belonging to the Portuguese; area, 500,000 sq. miles; pop. estimated at from 4,000,000 to 12,000,000. It is watered by the Coanza and other rivers, and has a climate in which the excessive heat is greatly tempered by the trade-winds. The interior, in which tracts of amazing fertility occur, produces rice, millet, sugar-cane, yams, coffee, &c., and almost every kind of tropical fruit. The animals include wild cattle, lions, leopards, elephants, hippopotami, and many venomous serpents. The principal town is the seaport of St. Paul de Loanda, from which a railway runs some distance inland. Other railways have also been begun, but the Portuguese have done little to develop the resources of the country. Benguela and Mossamedes are also places of some trade.

ANGORA, or ENGOURI (the ancient *Ancyra*), a town of Asiatic Turkey, 215 miles E.S.E. of Constantinople, with which there is now railway communication. It is a picturesque place, with narrow streets climbing up a steep hill crowned by remains of the ancient fortifications. There are remains of Byzantine architecture, and relics of earlier times both Greek and Roman; and pieces of ancient masonry and sculpture are built into modern structures. Among the chief buildings are the Turkish high-school for boys, a well-appointed institution; the technical school, also a fine modern building; and the hospital. There are also various other schools, including Catholic schools. Angora has always been a place of some importance, and its prosperity has been increased by the railway, the export of grain being the chief business carried on. It has long been celebrated for the long-haired goats bred in its vicinity, which furnish the fine silky hair known as *mohair*; and this still forms a valuable export, though it has to compete with the mohair supplied by the goats which have been introduced into the Cape Colony. Other exports are goats' skins, yellow berries, mastic, tragacanth, and other gums; also honey and wax. British manufactures are imported to some extent. Estimated pop. 35,000.

ANGORA-GOAT. See above article, also GOAT, MOHAIR.

ANGOSTURA, or CIUDAD BOLIVAR, a city of Venezuela, capital of the state or province of Bolivar, on the right bank of the Orinoco, at a narrow pass (*angostura*) about 240 miles from the sea. The streets are regular and well paved, and the houses in general good, being built for the most part of stone. There is here a college, a hospital, and a handsome cathedral. It is the entrepôt of the commerce of the Orinoco, Apure, Rio Negro, &c., and exports gold, hides, rubber, tobacco, coffee, cattle, and various other articles. There is little trade direct with Great Britain, but a considerable transit trade viâ Trinidad. British manufactured goods, &c., are imported; but commerce has been greatly hampered in consequence of revolutionary and other troubles. The climate is warm and tolerably healthy. (See also next article.) Pop. (1889), 11,686.

ANGOSTURA BARK, the aromatic bitter medicinal bark, obtained chiefly from *Galipea cusparia*, a tree of the rue family, usually from 10 to 20 feet high, which inhabits Colombia, Venezuela, and northern South America generally. The bark is one of the most valuable tonics and febrifuges which we possess. It is used as a tonic in cases of weak digestion and in recovery from acute diseases; and in warm climates it is found useful in remittent fevers and dysentery. Angostura bark is the ingredient from which the well-known *Angostura bitters* derive their name. On the European Continent this bark is said to be often adulterated, sometimes entirely replaced, by the poisonous bark of *Strychnos Nux Vomica*, for which reason its use as a medicine has in some countries been prohibited.

ANGOULÊME, a city of France, capital of the department of Charente, and formerly of the province of Angoumois, on the left bank of the Charente, 60 miles N.N.E. of Bordeaux. It stands on the summit of an isolated rocky hill, at the foot of which are the suburban quarters. The old part of the town is ill built, and the streets are narrow and crooked; but in the newer quarters the houses, of white stone, are well constructed, and the streets straight and spacious. There is a handsome modern town-house on the site of the old castle, once the residence of the ancient counts of Angoulême. The cathedral is a fine old Romanesque building, dating from the twelfth century. Angoulême possesses a lyceum, theological seminary, normal school, two hospitals, a lunatic asylum, theatre, &c.; besides a public library, with 16,000 volumes, and a museum of natural history. The staple manufacture is paper, made in numerous mills in the neighbouring valleys. There are also manufactures of carpets, fire-arms, gunpowder, wire; brandy distilleries, &c. A considerable trade is carried on. Angoulême represents the ancient *Iculisma*, destroyed by the Normans in the ninth century. The bishopric was founded in 379. Pop. (1906), 34,925.

ANGRA, a seaport on the south side of Terceira, one of the Azores, capital of the island, and of one of the three civil districts into which the group is divided. The town is finely situated and well built, and has a cathedral, monasteries, and nunneries, &c. King Alphonso VI. was imprisoned in the castle of Angra by his brother, Peter II., in 1668. The town derives its name from *angra*, a creek, bay, or station for shipping, this bay being the only convenient harbour in all the Azores. It is the residence of the governor-general of the whole group, and of the foreign consuls. Pop. (1900), 10,788.

ANGUILLA, or SNAKE ISLAND, one of the British West Indies, 175 miles east of Porto Rico. It is about 20 miles long and 6 broad, and is low and flat. The soil is calcareous and not very productive. A little sugar, cotton, tobacco, and maize are grown. There is a saline lake in the centre, which yields a large quantity of salt. The population is a little over 3000. It was settled by the English in 1659.

ANHALT, a duchy of North Germany, formed by the united duchies of Anhalt-Bernburg, Anhalt-Köthen, and Anhalt-Dessau. It lies partly in the plains of the Middle Elbe, and partly in the valleys and uplands of the Lower Harz, and is almost entirely surrounded by Prussian Saxony, a small portion of its western frontier being touched by Brunswick, and a larger portion of the north-east being bounded by the Prussian province of Brandenburg; area, 906 square miles. The soil throughout is fertile and well cultivated. All sorts of grain, wheat especially, are grown in abundance; also flax, rape, potatoes, tobacco, and hops. Some madder is also produced.

Garden fruit abounds, and in the valley of the Saale the vine is cultivated. The inhabitants are principally occupied in agricultural pursuits, though there are some iron works and manufactures of woollens, linens, tobacco, &c. The dukes of Anhalt trace their origin to Bernard (1170–1212), son of Albert the Bear. In the course of time the family split up into numerous branches, and at the establishment of the Germanic Confederation in 1815 the territory was held by three dukes (Anhalt-Köthen, Anhalt-Bernburg, and Anhalt-Dessau), each with sovereign power in his own division, and a separate vote in the general assembly of the Confederation. In 1847, however, the Anhalt-Köthen line became extinct, and in 1863 the Anhalt-Bernburg family died out, leaving the Duke of Anhalt-Dessau sole heir to the three duchies. The united principality is now incorporated in the German empire, and has one vote in the Bundesrath and two in the Reichstag. The estimated revenue and expenditure in the budget of 1910–11 each amounted to £1,482,630; and the public debt amounts to about £1,350,000. The population in 1905 was 328,029, almost all Protestants. The chief towns are Dessau, Bernburg, Köthen, and Zerbst.

ANHYDRITE, anhydrous sulphate of calcium, found in the salt-mines of Austria and Salzburg, and in large masses in the Harz Mountains near Osterode. It presents several varieties of structure and colour. The vulpinite of Italy is the only variety of anhydrite used in the arts. This mineral possesses a granular structure, resembling a coarse-grained marble. Its colour is grayish-white, intermingled with blue. It is cut and polished for various ornamental purposes, under the name of *marmo bardiglio di Bergamo*.

ANILINE (C_6H_7N), a substance which has recently become of great importance, as furnishing a number of brilliant and durable dyes. It is found in small quantities in coal-tar, but the aniline of commerce is obtained from benzole or benzene, another of the fifty or sixty products of coal-tar, discovered by Faraday in 1825, and consisting of hydrogen and carbon (C_6H_6). Benzole, when acted on by nitric acid, produces nitro-benzole ($C_6H_5NO_2$); and this substance again, when treated with nascent hydrogen, generally produced by the action of acetic acid upon iron-filings or scraps, produces aniline, thus— $C_6H_5NO_2 + H_4 = C_6H_5NH_2 + H_2O$. Aniline is a colourless oily liquid, somewhat heavier than water, with a peculiar vinous smell, and a burning taste; it boils at a temperature of 359·6°, and forms crystallizable combinations with most of the acids. Its name is derived from *anil*, an old name for indigo, from the dry distillation of which substance it was first obtained by the chemist Unverdorben in 1826, though he then called it *crystallin*. When acted on by arsenious acid, bichromate of potassium, stannic chloride, &c., aniline produces a great variety of compounds, many of which are possessed of very beautiful colours, and are known by the names of aniline purple, aniline green, rosëine, violine, bleu de Paris, magenta, &c. The facility with which some of these colours may be converted into others again is truly remarkable. Aniline red, for instance, turns itself into violet, blue, yellow, brown, or green, at the will of the operator, and according to the method of treatment. The manufacture of these aniline or coal-tar dyes as a branch of industry was introduced in 1856 by Mr. Perkin of London, who then took out a patent for the making of aniline purple or mauve. This colour, next to aniline black, is one of the best of the aniline dyes for resisting the action of the sun's rays. In the London Exhibition of 1862 Mr. Perkins exhibited a solid cylinder of this dye, valued at £800. It required for its production the tar obtained from 2000 tons of coal, and contained enough colouring matter for 300 miles of silk. Since 1856 many new colours have begun to be regularly made, and the manufacture of these coal-tar dyes has reached large dimensions in Great Britain, in France, and especially in Germany.

ANIMAL, Animal Life. Life, in the earlier periods of natural history, was attributed almost exclusively to animals. With the progress of science, however, it was extended to plants; and man, though justly regarded as belonging to a higher order of being in respect of his intellectual, moral, and immortal nature, is in natural history, which confines its inquiries to his material organization, considered merely as the most perfect of all animals, intimately connected with them by a long chain of being, ascending by almost imperceptible gradations from the lowest and most imperfect manifestations of animal life. In their lowest manifestations, the vegetable and animal kingdoms are brought into such immediate contact that it becomes almost impossible to assign them precise limits, and to say with certainty where the one begins and the other ends. In consequence of this the proper place of certain organisms remains undecided, and the difficulty of defining animal life is greatly increased. What is animal life? What constitutes an animal? Linnæus defines the relations of the three kingdoms of nature by saying that 'minerals grow, plants live and grow, and animals live and grow and feel.' Animals are indeed endowed with sensation; but are all sensitive without exception? and do not some plants possess this faculty? Locomotion and sensation are not more certain characteristics of animals than life or irritability, for many animals are destitute of motor powers, and vegetate like plants. Neither are the chemical characters of animal substances more distinct. Animals are chiefly composed of nitrogen, and vegetables of carbon; but among the latter some are, like the former, composed principally of nitrogen. In some animals, moreover, substances almost exclusively confined to plants are found. Thus the outer wall of Sea-squirts (which see) contains *cellulose*, a substance largely found in plant-tissues, whilst *chlorophyll*, the colouring-matter of plants, occurs in Hydra and many other lower animals. From whatever point of view we consider these two kingdoms of nature we find them blended in so many ways, and separated from each other by such imperceptible gradations, that it is impossible to draw a line at which we can affirm that animal life ends and the vegetable begins. There are indeed certain organisms of lower grade (see Protozoa) the exact nature of which it is simply impossible to determine. We cannot therefore give a rigorous definition of the animal kingdom, but we may point out certain general characteristic which clearly distinguish this from the other kingdoms of nature. There are two kinds of motion in animals, one of which is voluntary and the other mechanical. The latter is involuntary, and belongs to the vegetative life of the animal. By this the vital actions are carried on independently of volition. By this the heart beats, the blood circulates, and the food is assimilated. The former is voluntary, and is peculiar to animal life; it cannot exist without a nervous system, or something equivalent, by which the animal perceives and wills. However feeble the manifestations of this will may be, it nevertheless exists in proportion to the simplicity or complexity of the organization of the creature which perceives and wills. Thus the *vibrio* and the *monas*, although apparently destitute of viscera, organs, and locomotive apparatus when they avoid or pursue surrounding objects, act in virtue of the impulses which guide and direct the life of higher organisms. One sense is sufficient to produce voluntary motion,

and therefore to constitute animal life; the *vibrio* and the *monas* have at least one sense analogous to that of touch. This kind of motion may exist without locomotion, as in the oyster. There is no one organ which characterizes the animal kingdom; and there is no single organ or tissue which is found in all animals if we except the primitive protoplasm (which see) which is common to all living forms. The head, the stomach, the system of circulation—in a word, all the complicated apparatus of higher animals disappears in other classes or undergoes a thousand various combinations of form and proportion. The organ of which the slightest injury in one animal produces instant death may be wounded or even extracted from another without fatal consequences; whilst some are killed by the loss of some parts of the body, others, such as Hydra, may be cut in pieces, and each fragment becomes a perfect animal. The distinctive points between animals and plants which are most to be relied on are those derived from the *nature and mode of assimilation of the food.* Plants feed on *inorganic matters*, consisting of water, ammonia, carbonic acid, and mineral matters. They can only take in food which is presented to them in a *liquid* or *gaseous* state. The exceptions to these rules are found chiefly in the case of plants which live *parasitically* on other plants or on animals, in which cases the plant may be said to feed on organic matters, represented by the juices of their hosts. Animals, on the contrary, require *organized* matters for food. They feed either upon plants or upon other animals. But even carnivorous animals can be shown to be dependent upon plants for subsistence; since the animals upon which Carnivora prey are in their turn supported by plants. When the lion devours an antelope he is thus merely eating plant-materials which by the antelope have been elaborated into animal tissues. The annihilation of plants would in fact mean the extinction of animal life.

Animals, further, can subsist on *solid* food in addition to liquids and gases; but many animals (such as the Tapeworms) live by the mere imbibition of fluids which are absorbed by their tissues, such forms possessing no distinct digestive system. Animals require a due supply of *oxygen gas* for their sustenance, this gas being used in respiration. Plants, on the contrary, require *carbonic acid.* Only plants which develop chlorophyll or green colouring-matter can, however, inhale carbonic acid; plants without chlorophyll inhaling oxygen, and thus resembling animals. The animal exhales or gives out carbonic acid as the part result of its tissue-waste, whilst the plant taking in this gas is enabled to decompose it into its constituent carbon and oxygen. The plant retains the former for the uses of its economy, and liberates the oxygen, which is thus restored to the atmosphere for the use of the animal. The plant from its inorganic food builds up a living plant, or transubstantiates inorganic into organized material. The animal does not possess this power, but breaks down its food and tissues into carbonic acid, water, ammonia, and urea, which substances form the food of plants. Animals receive their food into the interior of their bodies, and assimilation takes place in their internal surfaces. Plants, on the other hand, receive their food into their external surfaces, and assimilation is effected in the external parts, as are exemplified in the leaf-surfaces under the influence of sunlight.

The foregoing are the chief points upon which biologists rely for the distinction of animals from plants. But the structural and physiological identity of the two series becomes very close if we trace animal and plant life to their lowest grades, and when it is discovered that the tissues of both are formed primarily from a homogeneous *protoplasm* (which see). The relations of the animal and plant worlds as at present defined by science may best be expressed by drawing two circles so close to each other that at one point in their circumferences they shall actually merge the one into the other. The point of union, if we term one circle the animal world and the other the plant creation, will represent the common ground in which the Protozoa or lowest animals, and Protophyta, or lowest plants, meet. This point constitutes what has well been termed a 'biological No-man's Land,' where the characters, which are so clear and distinct when applied to the separation of the higher animals and plants, merge into a confusing identity.

ANIMAL CHEMISTRY. The department of organic chemistry, or that investigating the composition of the tissues of animals and plants, has of late years been successfully cultivated, with the result of revealing the presence of a large number of elementary substances in the fluids and solids of living bodies. Taking the human body as the most complex of living organisms, we find represented therein the four elements, which are sometimes distinctively named *organic elements*, and which are invariably found in living bodies. These are carbon, hydrogen, oxygen, and nitrogen. To these 'essential' elements may be added, as frequent constituents of the body, sulphur, phosphorus, lime, sodium, potassium, chlorine, and iron. The four organic elements are found in all the fluids and solids of the body. Sulphur occurs in albuminous fluids, in blood, and in many of the secretions. Phosphorus is also common, being found in nerves, in the teeth, and in fluids. Chlorine occurs almost universally throughout the body; lime is found in bone, in the teeth, and in the secretions; iron occurs in the blood, in urine, and in bile; and sodium, like chlorine, is of almost universal occurrence. Potassium occurs in muscles, in nerves, and in the blood-corpuscles. Minute quantities of copper, silicon, manganese, lead, and lithium are also found in the human body. The compounds formed in the human organism are divisible into the organic and inorganic. The most frequent of the latter is water, of which two-thirds (by weight) of the body are composed. The chief inorganic acids are hydrochloric, sulphuric, hydrofluoric, and silicic, these acids being combined with such bases as soda, potassium, lime, magnesia, &c. The principal *salts* found in the body are chlorides of sodium, potass, and ammonium; phosphates of soda, lime, potass, magnesium; and sulphates of sodium and potassium. Chloride of sodium, or common salt, exists in the human body to the amount of about 6 oz. The organic compounds may, like the *foods* from which they are formed, be divided into the nitrogenous and non-nitrogenous. Of the former variety the chief representatives are albumen (found in blood, lymph, and chyle), casein (found in milk), myosin (in muscle), these being named albuminates. Allied to the latter are the albuminoids, such as gelatin (obtained from bone), chondrin (from cartilage), and elastin (from elastic tissue). The derivatives of albumen are represented by urea and uric acid, obtained from the urine; leucin, cystin, taurin, &c., found in bile; creatin, obtained from muscle; and cerebrin and lecithin, from nerves. The non-nitrogenous compounds are represented (*a*) by organic acids, such as formic, acetic, butyric, stearic, lactic, oxalic, succinic, and oleic acids; (*b*) by animal starches and sugars; animal starch or *glycogen* resembling vegetable starch in its composition, and being found in the liver and placenta, whilst the sugars are represented by glucose, or grape-sugar, found in the

digestive system, and lactose, or sugar of milk; (*c*) by fats and oils, including stearin, palmatin, and olein, found in fatty tissue; and (*d*) by alcohols, of which group two compounds are found in the body, these being cholesterin, found in the bile, and glycerin, found in fats.

The chemical actions to which the body is subject comprise oxidations (exemplified by the formation of urea, water, and carbonic acid from albuminous matters), the oxygen being introduced into the blood in respiration. Chemical decomposition is also exemplified in the physiology of the human body, and fermentations are excited by the production of ferments by certain gland-cells. Thus ptyalin is the ferment of the saliva, whereby starchy foods are converted in the mouth into sugars; pancreatin of the sweet-bread secretion transforms fats into fatty acids and glycerin; and the gastric juice of the stomach, by aid of its ferment pepsin, transforms albuminates into peptones or soluble forms, in which they are readily absorbed.

ANIMALCULE, a general name given to many forms of animal life from their minute size. We thus speak of the 'Infusorian' Animalcules among the Protozoa (which see), and of the Rotifera (which see), or 'Wheel Animalcules,' which are included in the sub-kingdom Echinozoa, or among the lower groups of Annulosa. The term 'Animalcule,' it may be noted, is not now used in zoology in any strict significance, nor is it employed in classification. Its use is therefore only sanctioned by popular usage, and even in the latter case the general term is specialized by having prefixed to it the name of the group of organisms to which reference is being made. See PROTOZOA, &c.

ANIMAL HEAT. See TEMPERATURE OF ANIMALS.

ANIMAL MAGNETISM. See MAGNETISM.

ANIMALS, CRUELTY TO. Societies have been formed and laws passed for the prevention of cruelty to animals in England and other countries, those of England having been the first. By 12 and 13 Victoria, cap. xcii. (1849) it is provided that if any person shall cruelly beat, ill-treat, over-drive, abuse, or torture any horse, mare, gelding, bull, &c., any domestic animal whatever, in short, he shall forfeit a sum not exceeding £5 for every such offence, recoverable before a justice of the peace in a summary way. Bull-baiting, cock-fighting, and the like, are also included under the prohibitions of the act. If the animal, or any person or property, is injured, the guilty party may be further amerced in such sum, not exceeding £10, as the justice shall think fit. In 24 and 25 Victoria, cap. xcvii. s. 40, 41, provision is also made for the punishment of persons unlawfully and maliciously killing, maiming, or wounding cattle, dogs, birds, beasts, and other animals. See VIVISECTION.

ANIMAL WORSHIP. This practice is found to prevail or to have prevailed in the most widely distant parts of the world, both the Old and the New; in India, where it is a consequence of the belief in the transmigration of souls, according to which the soul of a god may pass into the body of an animal; in the heart of Africa, where it is still in life; in South America, where very remarkable instances of it were met with by the earliest Spanish visitors; but nowhere did it prevail to such an amazing extent and take such extraordinary developments as in ancient Egypt. Nearly all the more important animals found in the country were regarded as sacred in some part of Egypt. Some animals were held sacred throughout the whole land, but in many cases the animals enjoyed only a local reverence, and an animal that was worshipped in one nome might be an object of aversion in the next and destroyed at every opportunity. The degree of reverence paid to the sacred animals was such that the voluntary killing of one was punishable with death, and if any one killed an animal involuntarily in a nome in which it was held sacred he was punished by a fine. Throughout Egypt the killing of a hawk or an ibis, whether voluntary or not, was punished with death. So strong was the feeling of the people on this point that under one of the later Ptolemies, when it was of the utmost importance to the Egyptians that they should conciliate the Romans, even the intercession of the king was impotent to save from the fury of the people a Roman soldier who had killed a cat. The worship paid to these animals, however, was not, except in a few instances, paid to them as actual deities. The animals were merely regarded as sacred to the deities, and the worship paid to them was symbolical. The Egyptian idols always bore on a human body the head of the animal sacred to the god represented by the idol. Only in three cases were certain animals believed to be incarnations of the deities themselves. These were at Memphis, where the bull Apis was worshipped as an incarnation of Phtha; at Heliopolis, where the bull Mnevis was believed to be an incarnation of Osiris; and at Mendes, where a goat received worship as an incarnation of Khem.

ANIMA MUNDI, the soul of the world or universe; a certain pure ethereal substance or spirit, which was said by some ancient philosophers to be diffused throughout all nature. Plato treats at large of the soul of the world (*psuchē tou kosmou*) in his Timæus. He is considered by some the originator of this idea, but this is not at all probable. On the contrary, it is an ancient idea prevailing in the systems of certain eastern philosophers. The Egyptians also adopted it. Many philosophical and philosophico-religious sects entertained the same notion under a considerable diversity of forms. By the Stoics the *anima mundi* was believed to be the only vital force in the universe. In modern times the notion appears in the works of Paracelsus, Van Helmont, &c., in those of More and Cudworth, the Platonists, and in the philosophy of Schelling, who has incorporated it into his whole system.

ANIME, a resin exuding from the trunk of a large American tree, a species of *Hymenæa*. The tree is found particularly in Mexico and Brazil. A superior kind is sometimes imported from the East. It generally hardens in pieces of about the size of a hazel-nut, of a yellowish or reddish-white colour and dusty white on the outside. The pieces are very brittle, have a slightly aromatic smell, are softened by the heat of the mouth, and are soluble in spirits of turpentine, benzole, and ammonia, partially in cold and wholly in heated alcohol. It strongly resembles copal and like it is employed in making varnishes. Its specific gravity is 1·028 to 1·054.

ANIMISM, the name given to the system of medicine which was propounded by Stahl, and in which the rational soul (*anima*) is regarded as the principle of life. The body, according to Stahl, is a matter incapable of self-movement, and is not only first formed by the soul, but also set in motion by the working of its elastic power. Hence it was inferred that the source of disease must be looked for, not in the body, but in the soul, and medical treatment should be confined to an attempt to remove the obstacles which have arisen to the free and full working of the soul. Stahl's followers were called Animists. In a wider sense the term animism has been applied by Dr. E. B. Tylor, author of Primitive Culture, to express the general doctrine of souls and other spiritual beings, and in this sense

the word is now in general use. According to Tylor an animistic philosophy, or a philosophy explaining all the phenomena in nature not due to obvious natural causes by attributing them to spiritual agency, seems to have been developed everywhere among the communities of mankind in the earliest stages of their existence. Evidence of this he finds in the state of belief among savage tribes at the present day, which he assumes to have resembled that which obtained in the primitive societies of men, and in various superstitious beliefs and modes of thought that he points out in civilized communities as survivals of that philosophy or of beliefs that harmonize with that philosophy. Amongst the beliefs most characteristic of this philosophy is that of a human apparitional soul, that is, of a vital and animating principle residing in the body but distinct from it, bearing its form and appearance but wanting its material and solid substance.

ANIMUCCIA, Giovanni, an Italian composer, born about 1500 at Florence; died at Rome between 1569 and 1575. He was chapel-master of the basilica of St. Peter's at Rome, and was the first to compose *laudi* or hymns for several parts in oratorios. The works due to him are Madrigali e motetti a quattro e cinque voci (Venice, 1548); Missæ a cinque voci (Rome, 1567); Canticum beatæ Mariæ Virginis ad omnes modos factum (Rome, 1568).

ANIO (now *Aniene* or *Teverone*), a river in Italy, a tributary of the Tiber, which it enters from the east a short distance above Rome. The Livenza (the ancient Digentia) is one of its tributaries, its source being a clear spring (the Fons Bandusiæ of Horace) at the foot of Monte Gennaro (Mons Lucretilis), in the vicinity of which, amidst the most charming scenery, the remains of the Sabine villa of the poet are shown. Among the ancient villas on the banks of the Anio itself the most celebrated are those of Mæcenas and the Emperor Hadrian. The remains of the former are still to be seen some distance below Tivoli, where a branch diverted from the stream a little higher up in order to drive mills and other machinery tumbles down from woody heights, forming magnificent *cascatelle* or little cascades, some of which plunge through the hall and windows of the villa itself. The villa of Hadrian is like a town in size, and comprises temples, theatres, baths, halls of statuary, &c. The most remarkable of the modern villas adorning this river's banks is the Villa d'Este, built by Cardinal Hippolito d'Este in the sixteenth century and surrounded with splendid gardens. It is now fast going to decay.

ANISE (*Pimpinella Anisum*), an annual plant of the natural order Umbelliferæ. Two species of the same genus are found in Britain; but the plant producing the anise-seeds of commerce is a native of Egypt, Syria, the Greek islands, and other eastern countries. They are roundish and striated, flattened on one side, and pointed at one end; and of a pale colour, inclining to green. The best anise-seed is brought from Alicante in Spain. Anise-seeds have an aromatic smell and pleasant warm taste, accompanied with some degree of sweetness. They have long been employed in medicine, and have been considered useful in diseases of the lungs and complaints of the stomach. They give out all their virtue to rectified spirit; and a spirituous water is kept in the shops as a cordial, which is prepared from a mixture of equal parts of anise-seed and angelica. All parts of the plant, but especially the seeds, contain a volatile oil, which is obtained by distillation, in the proportion of 2 lbs. of oil to 1 cwt. of seed when only the seeds are used for the purpose. Star-anise or aniseed stars are the fruit of a small evergreen tree, the *Illicium anisatum*, belonging to the natural order Magnoliaceæ, and a native of China, Japan, and the Philippines. The properties of the star-anise (so called from the shape of the fruit) resemble those of the common anise, and it is used for the same purposes.

ANJOU, an ancient province of France, now forming the department of Maine-et-Loire, and parts of the departments of Indre-et-Loire, Mayenne, and Sarthe, with a total area of about 3000 square miles. The provinces that surrounded it formerly were Maine on the north, Bretagne on the west, Poitou on the south, and Touraine on the east. The capital was Angers, still the chief town of Maine-et-Loire. The noble river Loire divided the old province. The Andegavi are the earliest inhabitants of Anjou of whom we read. In 1060 the province passed into the hands of the house of Gatinais, of which sprang Godfrey V., who, in 1127, married Matilda, daughter of Henry I. of England, and so became the ancestor of the Plantagenet kings. Godfrey's son succeeded him as Count of Anjou in 1151, and in 1154, in right of his mother, ascended the throne of England as Henry II. Anjou remained in the possession of the English kings up to 1204, when John lost it to the French king Philip Augustus, who claimed it as a French fief for Prince Arthur, the nephew of John. In 1226 Louis VIII. bestowed this province on his brother Charles; but in 1328 Philip, a descendant of Charles and heir of this province, became king under the title of Philip VI., and reunited the province to the French crown. John I. raised it to the rank of a ducal peerage, and gave it to his son Louis. Henceforth it remained separate from the French crown till 1480, when it fell to Louis XI. of France by will of King René.

ANKARSTRÖM, Jan Jakob, the murderer of Gustavus III., was born about 1762, and was at first a page in the Swedish court, afterwards an inferior officer in the regiment of body-guards, and later an ensign in the royal-guards. His father was lieutenant-colonel, and knight of the order of the Sword. He was of a passionate and gloomy character, and maintained a continual opposition to the measures of the king, particularly those for limiting the power of the senate and nobles. The loss of a suit aggravated his animosity against the king. In 1783 he married and retired to the country; but in 1790 returned to Stockholm. He here united himself with several of the nobility, particularly the Counts Horn and Ribbing, Barons Bidke and Pechlin, Lieutenant-colonel Liljehorn, and others, and they decided upon the death of the king. Ankarström entreated that the murder might be left to him; but Ribbing and Horn putting in their claims, they cast lots, and it fell to Ankarström. On the 15th of March, 1792, the murderer attended a masquerade at which it was known that the king would be present, and mortally wounded his victim by the discharge of a pistol. (See Gustavus III.) He was discovered, arrested, and confessed his crime, but refused to betray his accomplices. He was condemned to death, scourged during several days, and finally dragged upon a cart to the scaffold, where he was executed on the 29th of April, 1792. Through the whole of his sufferings he showed the greatest calmness, boasting of his deed. The Counts Horn and Ribbing, and Colonel Liljehorn, were banished for life.

ANKLAM, a town in Prussia, in the province of Pomerania, in the government of Stettin, and 47 miles north-west of the town of that name, on the right bank of the river Peene, which is here navigable. It has a gymnasium, a royal military school, &c. The principal occupations are connected with iron-founding, machinery, sugar, soap, agriculture, and shipping. Pop. in 1900, 14,602.

ANKLE. See Foot, Anatomy.

ANKOBAR, or ANKOBER, a town in Abyssinia, in Shoa, on a steep conical hill 8200 feet high. Formerly the capital of Shoa, it is now a small place.

ANKYLOSIS, or ANCHYLOSIS, a disease of the joints, consisting in a rigidity which impedes the natural movement of the bones, and makes them act as if they formed only one piece. It is in fact an ossification of the joint, produced sometimes by age, and sometimes by an adventitious cause It exists in different degrees, and may be either *complete* or *incomplete*. When it is complete, or, in other words, when the joint becomes completely ossified, the utmost which art can do is to direct it into a position where the patient will be the least annoyed by it, and the member affected may continue as useful as possible; when it is incomplete, frequent and graduated friction, emollient fomentations, hot baths, &c. often succeed in removing it. The incomplete form of the disease is caused by a thickening of the *synovia* that lubricates the joint. Sometimes, in consequence of acute or chronic inflammations, the synovial liquid becomes as hard as plaster of Paris, and glues the bones together. A similar effect is sometimes produced by the protracted inactivity of a joint. The term false ankylosis is applied when the disease is not in the joint itself but in the tendinous and muscular parts by which it is surrounded.

ANKYLOSTOMIASIS, a disease known also as 'miner's disease', 'miner's worm disease', or 'miner's anæmia', common among miners in certain localities, and caused by the existence of great numbers of parasitic worms (*Ankylostoma duodenale*) in the duodenum or upper portion of the intestinal canal. These parasites cause anæmia or bloodlessness (deficiency of the red corpuscles), the sufferers being pallid, feeble, troubled with breathlessness, &c., and death may result if no cure be effected. The worms, however, may be easily got rid of by proper remedies. The disease is much more common on the Continent than in Britain.

ANN, or ANNAT, in Scottish law, the half-year's stipend of a living, after the death of the clergyman, payable to his family, or next of kin, under act 1672, cap. xiii. The right to the ann is not vested in the clergyman himself, but in his representatives; and, accordingly, it can neither be disposed of by him nor attached for his debts. If a clergyman die after Whitsunday (May 15), but before Michaelmas (September 29), the stipend for the first half of that year may be claimed by his executors, while that of the remaining half-year is the ann, and goes to the next of kin. If he survive Michaelmas the whole of that year's stipend is payable to his executors, while the next of kin have a right to the stipend for the first half of the following year.

ANNABERG, an important manufacturing town in Saxony, in the government of Zwickau, 47 miles south-west of Dresden. The church of St. Anna in this town, erected in the beginning of the sixteenth century, is one of the largest and finest churches in Saxony. The town owes its origin to the mines, which, about the end of the fifteenth and during the sixteenth century, were very productive. Mining (for silver, cobalt, iron, &c.) is still carried on to some extent, but the town is now chiefly dependent on its manufactures, particularly those of various kinds of lace, together with ribbons, fringes, and dress-trimmings, silks, and corsets. Some of these industries were introduced by Protestant refugees from Belgium, who fled from the persecutions of the Duke of Alva. Pop. (1905), 16,837.

ANNA COMNENA, daughter of Alexius Comnenus I., emperor of the East. She was born 1083, and died 1148. After her father's death she endeavoured to secure the succession to her husband, Nicephorus Briennius, but was baffled by his want of energy and ambition. She wrote (in Greek) a life of her father, Alexius, which, in the midst of much fulsome panegyric, contains some curious facts. An edition of this life was printed at the Louvre, 1651, folio, and a modern edition by Schopen was published in 1839 at Bonn. A translation of it into German is included among the Historische Memorien published by Schiller. She forms a character in Sir Walter Scott's Count Robert of Paris, and this will preserve her memory from oblivion longer than her own work.

ANNA IVANOVNA, Empress of Russia; born in 1693, the daughter of Ivan, the elder half-brother of Peter the Great. She was married in 1710 to the Duke of Courland, in the following year was left a widow, and in 1730 ascended the throne of the czars through the influence of the powerful princes Dolgorouki, who, when the male line of the house of Romanof became extinct on the death of Peter II., in 1727, preferred her to the other claimants, in the belief that while she reigned their influence would be paramount. They gained over the senate, and the nobles assembled at Moscow to offer her the crown of Russia on the condition that she would limit the absolute power of the czars, and do nothing without the advice of the council composed of the leading members of the Russian aristocracy. To these conditions she assented; but no sooner had she ascended the throne than she tore up the document in which she had subscribed these conditions, and proclaimed herself autocrat of all the Russias. She chose as her favourite Ernest John von Biren or Biron, who was soon all-powerful in Russia, and ruled with great severity. The Dolgoroukis and several other leading nobles were executed, and many thousand men exiled to Siberia. The foreign affairs of the state were managed by Biren with great vigour and prudence. In 1733 he forced the Poles to accept Augustus III. as king in place of Stanislaw Leszczynski, and between 1736 and 1739 he waged successful war with the Turks, General Münnich commanding the Russian forces. In 1737 Anna forced the Courlanders to choose Biren as their duke, and nominated him at her death regent of the empire during the minority of Prince Ivan (of Brunswick). Anna died in 1740. See BIREN.

ANNALS, an historical account of the affairs of a state, digested in the order of time, and written in a simpler style than history proper. The name comes from the first annual records of the Romans, which were called *annales pontificum* or *annales maximi*, and the compilation of which was the business of the *pontifex maximus* (chief pontiff). These were hung up in the dwelling of the chief pontiff for the information of the people. They were also called *fasti annales* or *fasti historici*, the adjective being used to distinguish them from the *fasti sacri* or *Kalendares*. (See FASTI and ROME—History, vol. xii. p. 151.) As culture increased among the Romans the practice of keeping such annals was adopted also by various private individuals, as by Fabius Pictor, Calpurnius Piso, Sisenna, and others. The name hence came to be applied in later times to historical works in which the matter was treated with special reference to chronological arrangement, according to the years in which the events occurred, as to the annals of Tacitus. Still later the word acquired the more extended signification given in our definition.

ANNAM. See ANAM.

ANNAMABOE, or ANAMABO, a seaport in the British colony of the Gold Coast, 10 miles east of Cape Coast Castle. It was at one time a principal mart for slaves, in trafficking in which many of its inhabitants became wealthy. It is still a place of considerable trade. The country around is thickly

wooded, and the soil is excellent, but little cultivated. Fish are very plentiful on the coast at certain seasons. Pop. about 3000.

ANNAN, a royal and parl. burgh in Scotland, on the left bank of the Annan, about two miles above its entrance into the Solway Firth, 14 miles south-east of Dumfries. It is a neat and well-built town, and contains a town-house, two parish churches, and several other places of worship, and a mechanics' institute. A certain number of the inhabitants are employed in quarrying, and there are extensive nurseries round the town. Vessels of 250 tons can come up the river to within a short distance of Annan, but the shipping trade is not large. Annan is one of the Dumfries district of burghs. It is a place of considerable antiquity. The celebrated Edward Irving was a native, and Carlyle both attended school and taught here. The Caledonian railway crosses the Solway near Annan by an iron viaduct nearly 2 miles long. Pop. in 1901, 5804.—The river ANNAN has a course of some 50 miles, flowing from north to south through the centre of Dumfriesshire to the Solway Firth, its sources being not far from those of the Tweed and Clyde.—ANNANDALE, the valley of the river Annan, is a fine pastoral district. It gave the now dormant title of marquis to the family of the Johnstones, and was the scene of many interesting events during the border wars of Scotland.

ANNAPOLIS, a seaport of Maryland, United States, 20 miles south of Baltimore. It is the seat of the state government, is a pleasant and healthy town, and contains a college (St. John's), an elegant state-house, and the United States naval academy. Before the rise of Baltimore it was a place of wealth and extensive commerce, and its former importance is evidenced by the many large old mansions still here. Pop. (1900), 8402.—There is another Annapolis, a small town in Nova Scotia, on an inlet of the Bay of Fundy, with an important herring-fishery. It is one of the oldest European settlements in America, dating from 1604.

ANN ARBOR, a town of Michigan, United States, capital of Washtenaw county, on the Huron river, about 40 miles west of Detroit. It is well and regularly built; is the seat of the state university, with a library, astronomical observatory, and chemical laboratory in connection with it, contains several flour-mills, and manufactures woollens, iron, agricultural implements, &c. Pop. (1900), 14,509.

ANNATES, a year's income due to the pope on the death of any bishop, abbot, or parish priest, to be paid by his successor. In later times two dues of different origin were confounded under this name. The older of these dues formed what were called the *servitia majora* and *minora*, originating in a practice which prevailed among presentees to benefices from a very early period in the history of the church, of making a present to the ecclesiastical dignitary by whom they were consecrated. The practice was condemned by several councils as tainted with simony, but in spite of repeated condemnations and prohibitions continued to prevail until it assumed the character of a fixed tax, which was gradually appropriated by the higher clergy, and finally by the pope. The *servitia majora* were the regular consecration dues, and in some cases amounted to as much as a whole year's income of the benefice, and were often increased by the *servitia minora* or lesser services otherwise called pulpit dues. The proportion of the services to the annual income varied, however, with different benefices, and sometimes they were not claimed at all, until in 1392 Boniface IX. fixed them for all at one-half of the year's income and made them a perpetual tax. The annates proper, on the other hand, had a feudal origin, and arose when feudal rights came to be possessed by the higher members of the hierarchy. The ecclesiastical dignitaries possessed of these rights claimed, like all feudal superiors, the income of a fief between the death or deprivation of one holder and the entry into possession of another, and this claim they extended to all benefices in their patronage, which it became customary for them to keep vacant for one year after the death of a beneficiary. In the course of the fourteenth century the popes, at first at intervals and afterwards permanently, claimed all these revenues for themselves, and continued to levy them in all Roman Catholic countries in spite of the fact that the levying of both kinds of annates (*servitia* and *annates* proper) was condemned by the Council of Basel in 1434. In Germany the payment of them was expressly stipulated for in the concordat of Vienna of 1448, but they were abolished, so far as they continued in use, in 1803. They have since, however, been revived for the superior benefices in concordats concluded with some of the individual states of Germany, as in the Bavarian concordat of 1817. In France, although several times prohibited by the kings, they were not finally abolished till the revolution of 1789. This abolition was recognized by the pope in the concordat of 1801. In England, they were at first paid to the Archbishop of Canterbury, but afterwards appropriated by the popes. In 1532 the Parliament gave them to the crown; but Queen Anne restored them to the church by applying them to the augmentation of poor livings. See QUEEN ANNE'S BOUNTY.

ANNATTO, ARNOTTO, or ROUCOU, an orange-red colouring matter, obtained from the seeds of the *Bixa Orellana*, a shrub native to South America, but cultivated in the West Indies and the East Indies. It is obtained from the seeds by rasping or grinding them, adding water, and suffering the mixture to putrefy or ferment; the pulp is then strained through sieves, and boiled down to the consistence of paste. It is brought to European countries in cakes or balls of 2 to 4 lbs. weight, enveloped in leaves or rushes. It is only partially soluble in water, but alcohol and ether act readily upon it, and form solutions which, when evaporated, give the colouring matter in a pulverulent state. It is soluble in alkalies and their carbonates, by which means it is fixed in cloth. It is used to dye silks golden-yellow, by simply digesting them in its alkaline solution; and orange-red, by afterwards exposing them to the action of a dilute acid. It is also employed to dye cotton yellow, with aluminate of potash as a mordant. In dyeing it does not produce a very durable colour. It is also used in medicine for tinging plasters and ointments, and to a considerable extent by farmers for giving a rich colour to cheese and butter.

ANNE, the last member of the family of Stuart who was seated upon the throne of Great Britain, was born at St. James's Palace, London, on the 6th of February, 1665, five years after her uncle, Charles II., was restored to the throne. She was the second daughter of James II., then Duke of York, and Anne, his wife, daughter of the Earl of Clarendon. Her father had not then gone over to the Roman Church; and Anne was therefore educated according to the principles of the English Church. In 1683 she was married to Prince George, brother to King Christian V. of Denmark. On the arrival of the Prince of Orange in 1688, Anne, the favourite daughter of James, wished to remain with her father; but being entirely under the influence of Lady Churchill, wife of Lord Churchill, afterwards Duke of Marlborough, she was prevailed upon by her and her husband to join the triumphant party. After the death of William III. in 1702 she ascended the English throne. Her capacity was but moderate,

and she was governed first by Marlborough and his wife, and afterwards by Mrs. Masham. The Tories were satisfied to know that the sceptre was in the hands of a daughter of James II., and hoped to see the old royal house revived in her male descendants. The Whigs rejoiced that the queen, faithful to the triple alliance, opposed the domineering spirit of Louis XIV. Most of the principal events of her reign are connected with the war of the Spanish Succession, which was carried on in pursuance of this policy and lasted through the greater part of Anne's reign (1702–11). The details of this war will be found under SUCCESSION WARS, MARLBOROUGH, EUGÈNE, &c. The only important acquisition that England made by it was Gibraltar, which was captured in 1704, and has been held by us ever since. Another very important event of this reign was the union of England and Scotland under the name of Great Britain, which was accomplished in 1707. As long as the Duchess of Marlborough retained the favour of the queen the Whigs held the government of the country; but when the haughtiness and presumption of the duchess at last became distasteful to the queen the opposite party rose into power, and in 1710 the Whig ministry of Godolphin was superseded by a Tory one with Harley (Earl of Oxford) and St. John (Bolingbroke) at their head. Notwithstanding the measures which Anne publicly took against her half-brother, James the Pretender, on one occasion when he attempted a landing in Scotland, she seems not to have given up the hope of securing to him the succession in opposition to the act of settlement; but the irreconcilable enmity of Oxford and Bolingbroke, the former of whom accused the latter of favouring the Pretender, was an insurmountable obstacle. Grieved at the disappointment of her secret wishes, she fell into a state of weakness and lethargy, and died, August 1, 1714. The words, 'O, my dear brother, how I pity thee!' which she pronounced on her death-bed, unveiled the secret of her whole life. The reign of Anne was distinguished not only by the brilliant successes of the British arms, but also on account of the number of admirable and excellent writers who flourished at this time, among whom were Pope and Addison. It may be considered the triumph of the English High-church party, owing to her strong predilection for the principles by which it has always been actuated. Her private character was amiable, but her good sense was rendered ineffectual by want of energy. The goodness of her disposition obtained for her the title of the *good Queen Anne*. She was an excellent wife and mother, and a kind mistress. She bore her husband many children, all of whom died in infancy except one son, the young Duke of Gloucester, who died in 1699 at the age of twelve.

ANNEALING, a process to which many articles of metal and glass are subjected in order to render them more tenacious, and which consists in heating them and allowing them to cool slowly. When the metals are worked by the hammer, or rolled into plates, or drawn into wire, they acquire a certain amount of brittleness, which destroys their usefulness, and has to be remedied. This is done by annealing, and with some articles the process has to be repeated a number of times before they are finished. The tempering of steel is one kind of annealing. Annealing is particularly employed in the glass-houses, and consists in putting the glass vessels, as soon as they are formed and while they are yet hot, into a furnace or oven, not so hot as to remelt them, in which they are suffered to cool gradually. This is found to prevent their breaking so easily as they otherwise would, particularly on exposure to heat. Unannealed glass, when broken, often flies into powder with great violence, and in general it is in more danger of breaking from a very slight stroke than from one of considerable force. An unannealed glass vessel will often resist the effect of a pistol-bullet dropped into it, yet a grain of sand falling into it will make it burst into small fragments, and, which is very curious, it will often not burst until several minutes after being struck. The same phenomena are still more strikingly seen in the glass-drops or tears called 'Prince Rupert's drops' (which see).

ANNECY, an ancient town in France, in the department of Haute-Savoie, said to derive its name from Anicius, a Roman governor. It is pleasantly situated at the north extremity of the Lake of Annecy, 21 miles south of Geneva; contains a cathedral and a college, and is overlooked by a ruinous old castle (now used for barracks), in which the counts of Genevois were wont to reside. Its inhabitants are chiefly employed in manufacturing cotton, leather, paper, and hardware. It also possesses some blast-furnaces. Pop. (1906), 13,411.

ANNELIDA, a class of lower Annulosa or articulate animals, represented by the various kinds of worms. The class is distinguished by the segmented or jointed bodies of its members, and by possessing a double chain of nerves, which, as in all Annulosa, lies on the ventral or inferior aspect of the body. There are no articulated or jointed limbs attached to the body-segments, and hence the Annelida form the chief class of the *Anarthropodous* group of the Annulosa, the Insects, Crustaceans, &c., which possess jointed limbs, being named *Arthropoda*. The body in the Annelida is provided with bristles or *setæ*, which are usually attached to the lateral surfaces of each segment, the bristles being borne on 'foot-processes' or *parapodia*. Four parapodia exist to each segment, two on either side, one being situated towards the back or dorsal region, and named the *notopodium*, whilst one is situated towards the ventral surface, and is named the *neuropodium*, from its proximity to the nervous or neural aspect of the body. When gills are developed (as in marine worms) they are borne on the upper or dorsal half of the segment. The number of segments varies. As many as 400 may be found in some sea-worms (*Eunice*). A complete digestive system is developed, consisting of a mouth—armed with horny jaws and a protrusible proboscis—gizzard, stomach, and intestine. In the Leeches (which see) the digestive system undergoes a considerable modification from the type of the class. No distinct heart exists, the true blood-circulation being represented by the fluid named the *chylaqueous fluid*, which is derived from the digestion of food, and which circulates through the body-cavity—a space between the digestive system and walls of the body. A system of vessels, often provided with contractile walls, and containing a coloured fluid in which float numerous corpuscles, is found in Annelides, and is named the *pseudo-hæmal system*, this system being frequently, but erroneously, spoken of as the blood-system of these forms. The pseudo-hæmal vessels more properly correspond to an excretory system, or one serving to get rid of the waste products of the body; and this latter view is supported by the fact that the pseudo-hæmal vessels of Annelides have close connections with the respiratory or breathing organs, which latter are of course excretory in function. The breathing organs consist either of gills or of small sacs formed of an involution of the skin, whilst breathing may be performed by the general surface of the body. The organs of sense consist of *pigment-spots* or *ocelli*, which may be regarded as simple eyes, whilst tentacles or feelers are usually developed on

the head. The sexes may either be distinct (*diœcious*) or may be united in the same individual (*monœcious*). The embryos are provided with ciliæ; and in some forms the asexual process of budding or *gemmation* may be carried on. The class Annelida is divided into four orders—namely, the Leeches (*Hirudinea* or *Suctoria*); Earth-worms (*Oligochæta*); Tube-dwelling Worms, such as *Serpula*, &c., forming the order *Tubicola;* and the *Errantia*, or order containing the greater number of marine worms. The two former groups are named *Abranchiata*, from the absence of gills, the Tubicola and Errantia being collectively named *Branchiata*, from the possession of gills or branchiæ.

ANNE OF AUSTRIA, Queen of France, was the daughter of Philip III., king of Spain, of the Austrian house of Hapsburg, and was born at Madrid in 1602. In 1615 she was married to Louis XIII. During the life of her husband she had to submit to numberless mortifications. Richelieu, fearing the influence of her foreign connections, did everything he could to humble her, and for the most part kept her confined to her retreat of Val-de-Grâce. The birth of a son in 1638, however, was the occasion of establishing better relations for a time between her and her husband. In 1642 her great enemy Richelieu died, and in 1643 Louis himself. Anne was then left regent, but by the will of Louis was placed completely under the control of a council. But the Parliament overthrew this arrangement, and intrusted her with full sovereign rights during the minority of her son Louis XIV. She, however, brought upon herself the hatred of the nobles by her boundless confidence in Cardinal Mazarin, and was forced to flee from Paris during the wars of the Fronde. (See FRONDE and MAZARIN.) She ultimately quelled all opposition, and was able in 1661 to transmit to her son unimpaired the royal authority which had been raised to such a pitch by the genius of Richelieu. She then gave up all concern with public affairs, and spent the remainder of her life in retirement. She died January 20, 1666.

ANNE OF CLEVES, the wife of Henry VIII., king of England, was the daughter of John III., duke of Cleves, and was born in 1515. The king asked her in marriage in 1540, after having seen a portrait of her drawn by Holbein; but it was not long before he was disgusted with the 'Flanders mare,' as he called her, and a divorce ensued within six months of the marriage. She died at Chelsea in 1557.

ANNO, or HANNO, Archbishop of Cologne in the eleventh century, born of a noble family of Suabia not earlier than 1000 A.D.; died in a monastery founded by himself at Siegberg, near Bonn, in 1075. The Emperor Henry III. made him his chancellor, and presented him to the archbishopric of Cologne, to which he was consecrated in 1056. After the death of Henry III., when the authority of the empire was threatened by the encroachments of the sovereign princes and the papacy, Anno, with the aid of Adalbert, archbishop of Bremen, and Otto, duke of Bavaria, made himself master of the person of Henry III.'s young son Henry IV., and secured for himself the administration of the empire (1062). His energetic government and his holy life, his paternal care for his see, his zealous reformation of monasteries and foundation of churches, gained him the character of a saint. The day on which he is commemorated is the 4th of December. The hymn in his praise is by some thought to have been written soon after his death; by others about 1183. It begins with the popular traditions of Germany, giving the history of the archiepiscopal seat at Cologne and of its thirty-three bishops (of whom seven were saints) before Anno. The poet then describes the secular and spiritual government of the saints, and his grief that his countrymen, by their internal discord, should madly hasten mutual destruction. Unable to suggest a remedy the patriot dies of grief at the ingratitude of those whom he had zealously striven to benefit. This hymn is one of the most important monuments of the early German national literature. The best version of it is to be found in Müllenhoff and Scherer's Denkmäler Deutscher Poesie und Prosa (Berlin, 1864).

ANNOBON, or ANNO BOM, a small but beautiful island of Western Africa, south of the Bight of Biafra, and belonging to the Portuguese. It is about 4 miles long by 2 miles broad, and rises abruptly from a sea of unfathomable depth to the height of 3000 feet. One lofty peak, which rises conspicuously above the rest, has a circular lake at its base, which appears to have been the crater of a volcano. The whole island is richly clothed with wood and verdure, and contains a number of villages, the largest of which, called Annobon, situated at the north-east extremity, consists of several lanes of rude huts. At this part of the island there is a good roadstead.

ANNONAY, a town in France, in the department of Ardèche, 33 miles S.S.W. of Lyons, pleasantly situated at the confluence of the Cance and Deaume, which join the Rhone about 6 miles below. The most prominent objects are a Gothic church with a lofty spire, and the adjoining buildings of a large and massive Ursuline convent; but more interest is felt in the obelisk erected to two distinguished natives of the town, Joseph and Stephen Montgolfier, who are not only considered the inventors of the balloon, but introduced several of the most important improvements in the art of making paper, and carried it to such perfection that the paper of Annonay was famous over Europe. There is also a statue of Boissy d'Anglas, who was born near Annonay. Besides paper there are important manufactures of glove leather, prepared chiefly from the skins of unweaned kids and lambs, felt, silk stuffs, gloves, hosiery, &c. Silk-throwing and the grinding of flour are also carried on. Pop. (1906), 15,661.

ANNUAL, in botany, is applied to plants that spring from seed, grow up and produce seed, and then die, all within a single year or season.

ANNUAL REGISTER, a publication commenced in 1758 by Dodsley, the celebrated London publisher, and since continued in yearly volumes down to the present day. It contains a complete record of all the more important events, domestic and foreign, of each year, including a narrative of the proceedings in Parliament, and obituary notices of distinguished persons who have died. To the historian in search of information on recent European history the volumes of the Annual Register afford a most invaluable storehouse of facts, succinctly and impartially related. The historical department of the Annual Register was in the first years of its existence written by Edmund Burke. A rival publication, the New Annual Register, was started in 1781 by Dr. Kippis, and continued to appear till 1825. The Edinburgh Annual Register, the historical part of which was for several years contributed by Sir Walter Scott, and afterwards by Robert Southey, commenced in 1808, and came to a close in 1827. A French Annual Register, bearing the title of Annuaire historique, appeared in 1818–59, and its volumes contain a great amount of valuable material. It has been succeeded by the Année Politique, the publication of which was begun in 1874.

ANNUAL RENT, in Scottish law, a term synonymous with interest. Previous to the Reformation, when the taking of interest for the use of money was

prohibited, a customary mode of evading the restriction was by the creditor purchasing a right of annual rent or payment of a yearly sum from the lands of his debtor, redeemable on repayment of the purchase-money. The legality of taking interest for money being re-established at the Reformation, bonds of annual rent fell into disuse, and were superseded by the heritable bond, and subsequently by the bond and disposition in security.

ANNUALS, the name given to a class of publications which at one time enjoyed an immense yearly circulation, and were distinguished by great magnificence both of binding and illustration, which rendered them much sought after as Christmas and New Year presents. Their contents were chiefly prose tales and ballads, lyrics, and other poetry. The popularity of these periodicals, however, was but evanescent, and of the numerous annuals which formerly adorned in such variety the drawing-room and boudoir tables not one is now in existence, the Keepsake being the last to quit the field in 1856. The earliest of these annuals was the Forget-me-not, started in 1822, and followed next year by the Friendship's Offering. The Literary Souvenir was commenced in 1824, and the Keepsake in 1827. Among the names of the editors of these and other annuals, at various times, occur the names of Mr. Alaric A. Watts, Mrs. S. C. Hall, Mr. Harrison Ainsworth, the Countess of Blessington, Mary Howitt, &c. The popularity of the annuals reached its zenith about 1829, when no less than seventeen made their appearance. Subsequent to this period they gradually declined, diminishing to nine in 1840; and at last, in 1856, as above mentioned, becoming totally extinct.

ANNUITIES are periodical payments of money, amounting to a certain annual sum, and continuing either a certain number of years, as ten, twenty, or a hundred, or for an uncertain period, to be determined by a particular event, as the death of the annuitant, or that of the party liable to pay the annuity, or of some other person, or indefinitely; and these last are called *perpetual* annuities. The payments are made at the end of each year, or semi-annually, or at the end of every quarter, or at other periods, according to the agreement upon which the annuity arises; and where it is liable to cease upon the happening of an event the period of the occurrence of which is uncertain (for example, the death of a person), and such event happens after the expiration of a part of the time between one payment and another, neither the annuitant nor his heirs will be entitled to any proportional part of a payment for such time, unless some express provision is made for this purpose in the contract. The probability of the loss of such fractional part is to be taken into consideration in estimating the present value of the annuity; for example, if the life in question is, according to the tables of longevity, good for five and a half years, an annuity for such life is worth more than if it were good for only just five years, since the probability of its continuing six years is greater. An annuity is usually raised by the present payment of a certain sum as a consideration whereby the party making the payment, or some other person named by him, becomes entitled to an annual, semi-annual, quarterly, or other periodical payment of a certain sum for a stipulated number of years, or for a period to be determined by the happening of a certain event, the rules and principles by which this present value is to be computed have been the subjects of much scientific investigation. The present value of a perpetual annuity is evidently a sum of money that will yield an interest equal to the annuity, and payable at the same periods; and an annuity of this description, payable quarterly, will evidently be of greater value than one of the same amount payable annually, since the annuitant has the additional advantage of the interest on three of the quarterly payments until the expiration of the year; or, in other words, it requires a greater present capital to be put at interest to yield a given sum per annum, payable quarterly, than to yield the same annual sum payable at the end of each year. The present value of an annuity for a limited period is a sum which, if put at interest, will at the end of that period give an amount equal to the sum of all the payments of the annuity and interest; and, accordingly, if it be proposed to invest a certain sum of money in the purchase of an annuity for a given number of years the comparative value of the two may be precisely estimated, the rate of interest being given. But annuities for uncertain periods, and particularly life annuities, are more frequent, and the value of the annuity is computed according to the probable duration of the life by which it is limited. Many such annuities are granted for public services; and as these do not arise from a specific contract, and are not usually subjects of purchase, their precise value is not often a subject of investigation. But life annuities are often created by contract, whereby the government or a private annuity office agrees, for a certain sum advanced by the purchaser, to pay a certain sum annually in yearly, quarterly, or other periodical payments, to the person advancing the money, or some other annuitants named by him, during the life of the annuitant; or the annuity is granted to the annuitant, his heirs and assigns, during the life of some other person, or during two or more joint lives, or during the life of the longest liver or survivor among a number of persons named in the act or agreement whereby the annuity is raised. Such annuities are usually made transferable, and are sold and purchased in the market as a species of public stocks. When granted by a government they are generally one mode of raising loans; when created by a contract with a private corporation or company their object usually is to give the annuitant the use, during his life, not only of the income of his capital, but of the capital itself. If a person having a certain capital, and intending to spend this capital and the income of it during his own life, and leave no part to his heirs, could know precisely how long he should live, he might lend this capital at a certain rate during his life, and by taking every year, besides the interest, a certain amount of the capital, he might secure the same annual amount for his support during his life in such manner that he should have the same sum to spend every year, and consume precisely his whole capital during his life. But since he does not know how long he is to live he agrees with the government or an annuity office to take the risk of the duration of his life, and agree to pay him a certain annuity during his life in exchange for the capital which he proposes to invest in this way. The probable duration of his life therefore becomes a subject of computation; and for the purpose of making this calculation tables of longevity are made by noting the proportions of deaths at certain ages in the same country or district. The celebrated mathematician, Dr. Halley, was the first who calculated a table of mortality, which he deduced from observations made at Breslau in Silesia. In 1724 Mr. De Moivre published the first edition of his tract on Annuities on Lives. In order to facilitate the calculation of their values Mr. De Moivre assumed the annual decrements of life to be equal—that is, he supposed that out of eighty-six (the utmost limit of life on his hypothesis)

persons born together one would die every year till the whole were extinct. This assumption agreed pretty well with the true values between thirty and seventy years of age as given in Dr. Halley's table, but was very remote from the truth in the earlier and later periods. Mr. Thomas Simpson, in his work on Annuities and Reversions, originally published in 1742, gave a table of mortality deduced from the London bills, and tables founded upon it of the values of annuities. But at the period when this table was calculated the mortality in London was so much higher than in the rest of the country that the values of the annuities given in it were far too small for general use. In 1746 M. Deparcieux published, in his Essai sur les Probabilités de la Durée de la Vie Humaine—a work distinguished by its perspicuity and neatness—tables of mortality deduced from observations made on the mortuary registers of several religious houses, and on lists of the nominees in several tontines. In this work separate tables were first constructed for males and females, and the greater longevity of the latter rendered apparent. M. Deparcieux's tables were a very great acquisition to the science. Dr. Price's famous work on Annuities, the first edition of which was published in 1770, contributed powerfully to direct the public attention to inquiries of this sort, and was in this respect of very great utility. Of subsequent works among the best are those of Mr. Francis Baily and Mr. Joshua Milne, which indeed are both excellent. The former published Doctrine of Interest and Annuities in 1808, and Doctrine of Life Annuities and Assurances in 1810. Mr. Milne, who was actuary to the Sun Life Assurance Society, published his famous work A Treatise on the Valuation of Annuities and Assurances, &c., in 1815 (two vols. 8vo), the result being practically a revolution in actuarial science. Another valuable work on the subject was Mr. Finlaison's Report to the House of Commons on Life Annuities. The table on which Dr. Price laid the greatest stress was calculated from the burial registers kept at Northampton and some adjoining parishes between the years 1735–1780, and was long used as a basis in making calculations relating to annuities and life assurance business. There can be no doubt, however, as well from original defects in the construction of the table as from the improvement that has since taken place in the healthiness of the public, that the mortality represented in the Northampton table is, and has long been, decidedly above the average rate of mortality in England. The table most extensively used in England for the calculation of life annuities and for calculations of similar character has been that framed by Mr. Milne from observations made by Dr. Heysham on the rate of mortality at Carlisle. Mr. Milne's gives a decidedly lower rate of mortality than the Northampton table; but the mortality which it represents, as has been proved by subsequent experience and statistics, is not very different from the actual rate throughout most parts of England, though it cannot be supposed that a table founded on so narrow a basis should give a perfectly fair view of the average mortality of the entire kingdom. Latterly, the records of the registrar-general and the experience of government and life assurance offices have been utilized in the construction of annuity tables. In order to exhibit the foundations on which tables of life annuities and insurance have been founded in this and other countries we give in the following table the rate of mortality that has been observed to take place among 1000 children born together, or the numbers alive at the end of each year, till the whole become extinct, in England, France, Sweden, &c., according to the most celebrated authorities.

TABLE of the Probable Duration of Human Life; showing the Number of Persons alive at the end of every Year, from 1 to 100 Years of Age, out of 1000 born together, in the different places, and according to the Authorities undermentioned.

	England.			France.			Sweden.	Vienna.	Berlin.	Switzerland.	Silesia.	Holland.
Ages.	*Simpson.* London.	*Price.* Northampton.	*Heysham.* Carlisle.	*Deparcieux.* Annuitants, &c.	*Buffon.* Part Population.	*Duvillard.* Whole Population.	*Wargentin.* Whole Population.	*Süssmilch.*	*Süssmilch.*	*Muret.* Pays de Vaud.	*Halley.* Breslau.	*Kersseboom.* Life Annuitants.
1	680	748	846	745	781	768	780	542	688	811	769	804
2	548	625	778	709	682	672	730	471	528	765	688	768
3	492	582	735	682	591	625	695	430	485	735	614	736
4	452	553	700	662	557	599	671	400	434	715	585	709
5	426	536	680	647	540	583	656	377	408	701	563	689
6	410	521	668	634	528	573	644	357	387	688	546	676
7	397	509	659	624	511	566	634	344	376	677	532	664
8	388	499	654	615	501	560	625	337	367	667	523	652
9	380	492	649	607	494	556	618	331	361	659	515	646
10	373	487	646	600	489	551	611	327	356	653	508	639
11	367	483	643	595	486	547	606	322	353	648	502	633
12	361	478	640	590	482	543	602	318	350	643	497	627
13	356	474	637	585	479	538	597	314	347	639	492	621
14	351	470	634	581	476	534	594	310	344	635	488	616
15	347	465	630	578	472	529	590	306	341	631	488	611
16	343	461	626	574	468	524	586	302	338	626	479	606
17	338	457	622	570	464	519	582	299	335	622	474	601
18	334	452	618	565	459	514	578	295	332	618	470	596
19	329	446	613	561	455	508	574	291	328	614	465	590
20	325	441	609	556	449	502	570	288	324	610	461	584
21	321	434	605	551	445	496	565	284	320	606	456	577
22	316	428	601	545	438	490	560	280	315	602	451	571
23	310	421	596	540	432	484	555	276	310	597	446	566
24	305	415	592	534	430	478	551	273	305	592	441	559
25	299	409	588	529	419	471	548	269	297	587	436	551
26	294	402	584	523	414	465	541	265	293	583	431	543
27	288	396	579	517	408	458	535	261	287	577	426	535
28	283	389	575	512	402	452	530	256	281	572	421	526
29	278	383	570	506	398	445	525	251	275	567	415	517
30	272	376	564	500	388	438	519	247	269	563	409	508
31	266	370	559	495	384	432	513	243	264	558	403	499
32	260	364	553	490	377	425	507	239	259	553	397	490
33	254	357	547	484	371	418	501	235	254	548	391	482
34	248	351	542	479	366	411	495	231	249	544	384	474
35	242	344	536	474	355	404	488	226	243	539	377	467
36	236	338	531	469	339	397	482	221	237	533	370	460
37	230	331	525	464	341	390	477	216	230	527	363	453
38	224	325	519	459	334	383	471	211	223	520	356	446
39	218	318	514	454	330	376	465	205	216	513	349	439
40	212	312	508	449	314	369	459	199	209	506	342	432
41	207	305	501	444	310	362	453	194	203	500	335	425
42	201	299	499	439	302	355	445	189	197	494	328	419
43	194	292	487	434	297	348	437	185	192	488	321	413
44	187	285	480	429	292	341	430	181	187	482	314	407
45	180	279	473	424	279	334	422	176	182	476	307	400
46	174	273	466	419	278	327	414	171	177	469	299	393
47	167	265	459	418	269	320	407	165	172	461	291	386
48	159	259	452	408	262	312	400	159	167	451	283	378
49	153	253	456	402	258	305	392	153	162	441	275	370
50	147	245	440	396	242	297	385	147	157	431	267	362
51	141	238	434	390	239	289	376	142	152	422	259	354
52	135	231	428	384	233	282	367	137	147	414	250	345
53	130	224	421	378	229	274	358	133	142	408	241	336
54	125	217	414	371	224	265	349	128	137	397	232	327
55	120	210	407	363	212	258	340	123	132	388	224	318
56	116	203	400	355	207	249	331	117	127	377	216	309
57	111	196	392	346	202	240	322	111	121	864	209	300
58	106	189	384	888	194	232	312	106	115	848	201	291
59	101	182	375	329	190	223	303	101	109	381	193	282
60	96	175	364	319	168	214	293	96	103	314	186	278
61	92	168	352	309	165	204	282	91	97	299	178	264
62	87	161	340	299	157	195	271	87	92	286	170	255
63	83	154	327	288	150	186	259	82	88	274	163	245
64	78	147	314	278	144	176	247	77	84	252	155	235
65	74	140	302	267	135	166	235	72	80	250	147	225
66	70	133	289	256	126	157	224	67	75	236	140	215
67	65	126	277	245	117	147	212	63	70	220	132	205
68	61	119	265	234	106	137	200	57	65	202	124	195
69	56	113	251	222	100	129	187	52	60	184	117	185
70	52	106	240	211	90	118	175	48	55	168	109	175
71	47	99	228	199	86	108	162	44	51	153	101	165
72	43	92	214	187	75	99	149	40	47	140	93	155
73	39	85	200	175	70	89	135	36	43	129	85	145
74	35	78	184	162	63	80	121	33	39	119	77	135
75	32	71	168	148	52	72	108	30	35	109	69	125
76	28	65	152	134	47	63	96	27	32	98	61	114
77	25	58	136	120	42	56	84	24	29	85	53	103
78	22	52	121	106	36	48	75	21	26	71	55	92
79	19	46	108	94	34	41	65	18	23	58	88	82
80	17	40	95	81	28	35	56	16	20	46	32	72
81	14	35	84	70	21	29	47	14	18	36	26	62
82	12	30	73	59	18	24	38	12	16	29	22	53
83	10	25	62	49	15	19	31	10	14	24	18	45
84	8	20	53	40	12	15	24	8	12	20	15	38
85	7	16	45	33	10	12	19	7	10	17	12	31
86	6	12	37	26	8	9	14	6	8	14	9	25
87	5	9	30	21	7	7	11	5	7	11	6	19
88	4	7	23	16	5	6	8	4	6	9	4	14
89	3	5	18	12	4	5	6	3	5	7	3	10
90	2	4	14	8	3	4	5	2	4	5	1	7
91	1	3	10	5	3	3	3	1	3	4	..	5
92	..	2	8	3	2	3	2	..	2	3	..	4
93	..	1	5	1	2	2	1	..	1	2	..	2
94	..	1	4	1	1	2	..	..	..	1	..	1
95	..	..	3	..	1	1	..	..	..	..	..	..
96	..	..	2	..	..	1	..	..	..	..	..	..
97	..	..	2	..	..	1	..	..	..	..	..	..
98	..	..	1	..	..	..	..	..	..	..	..	..
99	..	..	1	..	..	..	..	..	..	..	..	..
100	..	..	..	..	..	..	..	..	..	..	..	..

In order to calculate from this table the chance which a person of any given age has of attaining to any higher age, we have only to divide the number of persons alive at such higher age given in that column of the table selected to decide the question, by the number of persons alive at the given age, and the fraction resulting is the chance. We add, by way of supplement to this table, Mr. Finlaison's table of the rate of mortality among 1000 children born together according to the decrement of life observed to take place among the nominees in government tontines and life annuities in this country, distinguishing males from females. The rate of mortality which this table exhibits is decidedly less than that given in the Carlisle table; but the lives in the latter are the average of the population, while those in the former are all picked. Still, however, the table is very curious; and it sets the superiority of female life in a very striking point of view.

TABLE of the Progressive Decrement of Life among 1000 *Infants of each Sex, born together, according to Mr. Finlaison's Observations on the Mortality of the Nominees in the Government Tontines and Life Annuities in Great Britain.*

Age.	Males.	Females.	Age.	Males.	Females.	Age.	Males.	Females.	Age.	Males.	Females.	Age.	Males.	Females.	Age.	Males.	Females.
0	1000	1000	17	860	870	34	696	748	51	552	616	68	322	443	85	56	117
1	981	981	18	854	863	35	687	740	52	542	608	69	305	428	86	44	103
2	968	967	19	846	856	36	679	732	53	531	601	70	288	412	87	34	89
3	949	955	20	837	848	37	670	724	54	520	593	71	270	395	88	24	76
4	937	945	21	827	841	38	662	716	55	508	585	72	253	377	89	17	64
5	927	935	22	816	834	39	653	708	56	495	576	73	235	358	90	11	52
6	919	926	23	804	827	40	644	700	57	483	568	74	218	339	91	7	41
7	912	919	24	793	820	41	636	693	58	468	559	75	202	319	92	4	30
8	906	913	25	782	813	42	627	685	59	454	549	76	185	298	93	3	21
9	901	908	26	771	805	43	619	677	60	440	539	77	171	277	94	1	14
10	896	903	27	761	798	44	610	669	61	426	529	78	156	255	95	..	8
11	891	899	28	751	791	45	602	661	62	413	519	79	141	233	96	..	5
12	886	895	29	742	784	46	594	654	63	399	508	80	125	210	97	..	2
13	881	892	30	732	777	47	586	646	64	385	496	81	110	189	98	..	1
14	876	887	31	723	770	48	578	638	65	370	484	82	95	168	99	..	..
15	872	883	32	714	763	49	570	631	66	355	471	83	81	149	100	..	..
16	866	876	33	705	755	50	561	623	67	339	457	84	68	132	..	..	..

Making use of data such as form the foundation of these tables, and guided by the calculations of professional actuaries most life assurance companies are now ready to grant immediate or deferred annuities of such amounts as may be desired on the payment of certain corresponding sums, the slump sums payable for an annuity of any particular amount varying between rather narrow limits for the different companies. Generally speaking, for every £100 paid down a male at the age of fifty-five last birthday may obtain an immediate annuity amounting to from £7 to £8 per annum; at the age of sixty, one of from about £8 to £9; at the age of sixty-five one of £10 to £10 15*s.*, and so on. These sums are calculated for an annuity paid half-yearly; the annuity is in most cases higher if paid in one annual payment. Females at corresponding ages have to pay rather more to secure the same sum. A certain amount of annuity business is transacted by the British Post Office department, but no annuity higher than £100 per annum is granted. To secure an immediate annuity of £100, the cost is, for males of twenty years, £2279, 3*s.* 4*d.*, for females of same age, £2482, 10*s.*; for males of thirty years, £2045, 8*s.* 4*d.*, for females, £2258, 6*s.* 8*d.*; for males of forty years, £1789, 6*s.* 8*d.*, for females, £1990; for males of sixty, £1148, 6*s.* 8*d.*, for females, £1275, 8*s.* 4*d.*; and so on. Deferred annuities, or such as have their first annual payments deferred for a greater or less number of years, are also granted. The rates for an annuity of £100 deferred twenty years are as follows: males aged twenty, £848 6*s.* 8*d.*, females, £1014, 13*s.* 4*d.*; males aged thirty-five, £557, 1*s.* 8*d.*, females, £697, 1*s.* 8*d.*; and so on. If the person should die before payment is to commence, the purchase money may be returned, provided an arrangement to this effect has been made, but the purchase money is of course higher.

ANNUNCIATION, the declaration of the angel Gabriel to the Virgin Mary, informing her that she was to become the mother of our Lord (Lu. i. 26–38). *Annunciation* or *Lady Day* is a feast of the church in honour of the annunciation, celebrated in the western churches on the 25th of March. The institution of this festival is generally assigned to the seventh century.—The Italian, formerly Sardinian, order of Knights of the Annunciation (*Ordine supremo dell' Annunziata*) was instituted by Amadeus VI., duke of Savoy, in 1360. It received statutes from Amadeus VIII. in 1409, was renewed in 1518, and raised to the first order of the Sardinian monarchy in 1720. The king is always grand-master. The knights, who must be of high rank, and must already be members of the order of St. Mauritius and St. Lazarus, form only one class. The decoration of the order consists in a golden shield suspended to a chain or collar of roses and knots, the letters F. E. R. T. being inscribed on the roses, and standing, according to some, for *Fortitudo ejus Rhodum tenuit.*—There are two orders of nuns of the Annunciation, one originally French, the other originally Italian. The French order was founded in 1501 by Joanna of Valois; the Italian in 1604 by Maria Vittoria Fornari of Genoa, and possessed at one time fifty nunneries, chiefly in Italy.

ANNUS DELIBERANDI, in Scottish law, the year allowed to an heir-apparent, dating from the ancestor's death, for deliberating whether he shall enter himself as heir to such ancestor, and thereby render himself liable for his debts and obligations. During this period no action could be insisted on against him in respect of his ancestor or predecessor's debts, though certain preliminary steps might be taken. The year for deliberating, formerly allowed to an heir-apparent, has by the act 21 and 22 Vict. cap. lxxvi. (1858) been reduced to six months.

ANODYNES. See ANÆSTHETICS.

ANOINTING. From time immemorial the nations of the East have been in the habit of anointing themselves for the sake of health and beauty; and to anoint a guest was to show him one of the highest marks of respect. The Greeks and Romans, particularly the former, anointed themselves after the bath. Wrestlers anointed themselves in order to render it more difficult for their antagonists to get hold of them. The use of oil for ceremonial purposes is equally ancient. The first mention of such a use is in Gen. xxviii. 18, where it is stated that Jacob, in commemoration of a remarkable dream, set up a pillar and poured oil upon it. In the Mosaic law, and several ancient religions, a sacred character was attached to the anointing of the garments of the priests, and things belonging to the ceremonial of worship. This could be done only with oil made for the purpose, and signified a consecration of the articles to the service of religion. The Jewish priests and kings were anointed when inducted into office, and were called the *anointed of the Lord*, to show that their persons were sacred, and their office from God. In the Old Testament also the prophecies respecting the Redeemer style him, on account of his royal descent and his dignity, *Messias*, that is, the *Anointed*, which is also the meaning of his Greek name Christ. The custom of anointing still exists in the Roman Catholic Church in the ordination of priests, in confirmation, in baptism, and in the sacrament of extreme unction. In the ceremony of ordination the ordaining bishop anoints with the holy oil called *chrism* the palm of both hands, the thumb, and the forefinger (by which the priests hold the host) of the person to be ordained; and thus, according to the expression of the ritual of ordination, the hands receive power to bless, to consecrate, and to make holy. If a priest is excommunicated these

spots are rubbed, as if to rub off the effect of the consecrating oil. The ceremony of anointing is also frequently a part of the coronation of kings.

ANOMALY, the deviation from a rule. That which deviates is called *anomalous*. It is also used in astronomy to denote the angle which a line drawn from a planet to the sun has passed through since the planet was last at its perihelion or nearest distance to the sun. On account of the planets not moving with the same velocity at all parts of their orbits, this angle does not increase uniformly; hence it derived its name. The *anomalistic year* is the interval between two successive times at which the earth is in perihelion, or 365 days 6 hours 13 minutes 45 seconds. In consequence of the advance of the earth's perihelion among the stars in the same direction as the earth's motion, and of the precession of the equinoxes, which carries the equinoxes back in the opposite direction to the earth's motion, the anomalistic year is longer than the sidereal year, which is measured by the sun's return to the same position among the stars, and still longer than the tropical or common year, which is measured by the earth's return to the same equinox. It exceeds the latter by 25 minutes.

ANONACEÆ, a natural order of trees and shrubs having simple, alternate leaves, destitute of stipules, by which character they are distinguished from the Magnoliaceæ, to which they are otherwise closely allied. Their flowers are commonly axillar, sometimes terminal. The calyx is persistent, with three deep divisions. The corolla is formed of six petals, disposed in two series. The stamens are very numerous, forming several series; their filaments short, their anthers almost sessile. The carpels, which are generally aggregated in great number in the centre of the flower, are sometimes distinct, sometimes connected; each of them has a single cell, which contains one or more ovules attached to the inner suture, and often forming as many distinct fruits (rarely one only in consequence of abortion); sometimes they are united together, and form a kind of fleshy and scaly cone. The seeds have a horny endosperm deeply grooved, and this is another character which distinguishes them from the Magnoliaceæ. The Anonaceæ are mostly tropical plants belonging both to the Old and the New World. They are generally aromatic, a quality found chiefly in the bark, but also in the leaves and flowers, and to some extent in the fruit, all of which parts are consequently employed in the countries to which the plants are native as remedies and for seasoning. Many of them yield likewise an edible and nutritious fruit, extremely agreeable to the taste. Among the principal genera are *Anona*, *Bocagea*, *Uvaria*.

ANONYMOUS (from the Greek), literally 'without name,' applied to anything which is the work of a person whose name is unknown, or who keeps his name secret. *Pseudonym* is an epithet applied to an assumed name. Writers often conceal themselves under a pseudo or false name, which they retain as authors even when their true name has long been known. The knowledge of the anonymous and pseudonymous authors is indispensable to the bibliographer. Among the principal works intended to supply this knowledge are Barbier's Dictionnaire des Ouvrages Anonymes et Pseudonymes, composés, traduits ou publiés en Français et en Latin, with historical and critical notes (second edition, Paris, 1822–27, four vols.); Demanne's Nouveau recueil d'ouvrages anonymes et pseudonymes (second edition, 1862); Pseudonomia, ovvero tavole alfabetiche de' nomi finti o supposti degli scrittori, con la contrapposigione de' veri by V. Lauretti (Venice, 1836); Dizionario di opere anonime e pseudonime di scrittori italiani, by G. Melzi (Milan, 1854–59); and Halkett and Laing's Dictionary of the Anonymous and Pseudonymous Literature of Great Britain (4 vols., 1882–88).

ANOPLOTHERIUM, an extinct genus of Ungulate or Hoofed Quadrupeds (see UNGULATA), nearly allied to the family Suida, or that of the Swine, and forming the type of a distinct family, *Anoplotheridæ*, which also contains the fossil genera *Xiphodon* (Upper Eocene Rocks), *Chalicotherium* (Miocene), and *Dichobune* (Middle Eocene). These animals were pig-like in form, but possessed long tails, and had a cleft hoof, with two rudimentary toes. Six incisors, two canines, eight premolars, and six molars existed in each jaw; and these animals are remarkable as having possessed a continuous series of teeth, no *diastema* or interval existing in the jaw. The Anoplotheridæ were in many respects intermediate between the Pigs and Ruminantia.

ANORTHITE. See FELSPAR.

ANOSMIA, a disease consisting in a diminution or destruction of the power of smelling. It is sometimes constitutional, but is most frequently caused by strong and repeated stimulants applied to the olfactory nerves. Hence slaves to the habit of snuff-taking are often affected by it.

ANQUETIL DU PERRON, ABRAHAM HYACINTHE, a distinguished orientalist, born in Paris, Dec. 7, 1731; died there Jan. 17, 1805. He studied theology first at Paris and afterwards at Auxerre and Amersfort. Returning to Paris he devoted himself to the study of Hebrew, Arabic, and Persian. His assiduous attendance at the library excited the attention of the Abbé Sallier, keeper of the MSS., who obtained for him a small salary as a student of the oriental languages. Accidentally meeting with some MS. fragments of the Zend-Avesta he resolved to go to India; and other means having failed he enlisted in 1754 as a private soldier. His zeal for science so deeply impressed Malesherbes and the Abbé Barthélemy that they obtained for him from government a free passage and a salary. Arrived at Pondichéry he learned modern Persian, and went to Chandernagore to study Sanskrit. War breaking out with England, during which Chandernagore was captured, he left that place, traversed a great part of the peninsula, and finally settled at Surat. Here he prevailed on some of the Parsee priests to instruct him in the Zend and Pehlevi, by which he was enabled to translate the dictionary called Vedidad-Sade, and other works from this language. They also gave him some of the Zoroastrian books. The fall of Pondichéry forced him to return to Europe, where he arrived in 1762 with 180 MSS. and other curiosities. Before returning to France he went to Oxford, and compared the manuscripts there with his own. The Abbé Barthélemy now obtained for him a situation in the Royal Library; and in 1763 he was chosen a member of the Academy of Belles-lettres. In 1771 he published his Zend-Avesta, a translation of the Vendidad, which excited great sensation. When the revolution broke out he shut himself up in his chamber with his books, and produced as the fruits of his retirement L'Inde en Rapport avec l'Europe (1790); and a selection from the theology of the Vedas, called Oupnek'hat, or The Unrevealable Mysteries (1804). The labours of Anquetil du Perron did good service to the cause of oriental philology and history, but his knowledge of the oriental languages was by no means exact, and his writings may now be said to be superseded.

ANSELM, ST., a celebrated Christian philosopher and theologian, regarded by some as the founder of scholasticism, born at Aosta in Piedmont in 1033; died at Canterbury, April 21, 1109. At the age of

twenty-seven he became a monk at Bec in Normandy, whither he had been attracted by the celebrity of his countryman Lanfranc, who was then prior of the monastery there. Three years later, when Lanfranc was promoted to the abbacy of Caen, he was himself elevated to the dignity of prior, and in 1078 he was made abbot, which he remained for fifteen years. During this period of his life he wrote his first philosophical and religious works: the dialogues on Truth and Free-will (De Veritate and De Libertate Arbitrii) and the treatises Monologion and Proslogion; and at the same time his influence made itself felt among the monks under his charge that Bec became the chief seat of learning in Europe. In 1093 Anselm was offered the archbishopric of Canterbury, which had lain vacant since the death of Lanfranc in 1089, and accepted the offer though with great reluctance and with the condition that the King of England, William Rufus, should acknowledge Pope Urban in opposition to the antipope Clement, which the king ultimately consented to do by private messengers. In 1097, a new difficulty having arisen between Anselm and William, the former set out for Rome to consult with the pope. Urban received him with great distinction, but did not venture to declare himself on the side of the prelate in his dispute with the king. Meanwhile William had seized on the revenues of the see of Canterbury, which he retained till his death in 1100. Anselm accordingly remained abroad, residing for a considerable period at a small village called Schlavia, where he wrote his celebrated treatise on the atonement, entitled Cur Deus Homo, and afterwards for some time at Lyons. When William Rufus was succeeded by Henry Beauclerc, Anselm was recalled; but Henry insisted that he should submit to be reinvested in his see by himself, although the popes claimed the right of investing for themselves alone. Much negotiation followed, and Henry did not surrender his claims till 1105, when Paschal II., the successor of Urban, threatened to excommunicate him. In the following year Anselm crossed over to England, where he resided during the short remainder of his life. His canonization seems to have taken place in 1494. All the works of Anselm are directed towards founding a reasoned system of Christian truth. Such a system he considered to be a legitimate demand of reason, although he repeats again and again the doctrine that faith is necessary to the intelligence of the Christian mysteries, that the teaching of revelation must first be accepted by faith and afterwards shown to have the support of reason. His celebrated ontological proof of the existence of God (see GOD) is to be found in the Proslogion. The Cur Deus Homo, treating, as already mentioned, of the atonement, is the most important of Anselm's works. In order to satisfy the reason of the need of an atonement and of the efficacy of the particular atonement that the Christian religion represents as having been made in the death of Christ, Anselm endeavours to establish the following positions: first, that God's honour is wounded by sin and his justice therefore requires satisfaction; second, that this satisfaction can be given only through one who is at once God and man; and third, that the voluntary death of Christ actually accomplished this satisfaction. The works of Anselm have often been published. The last complete edition forms the 155th volume of Abbé Migne's Patrologiæ Cursus Completus. Among the numerous separate editions of the Cur Deus Homo may be mentioned those of Lämmer (Berlin, 1857) and Fritzsche (Zürich, 1868). For information regarding the man himself, whose personal character, distinguished by single-mindedness, gentleness, large-heartedness, and piety, makes him one of the brightest ornaments of the Christian church, the reader may be referred to Eadmer's Vita Anselmi, and the works of Franck (Tübingen, 1842), Hasse (Leipzig, two vols. 1843–52), Rémusat (Paris, 1853), and R. W. Church (London, 1870).

ANSGAR, or ANSHAR, called the *Apostle of the North*, because he introduced Christianity into Denmark and Sweden. Born in 801 in Picardy, and educated in the monastery of Corbie, not far from Amiens, he took the monastic vows while still in his boyhood. In 822 he removed with some of the other monks belonging to his monastery to the newly-founded Corvey in Westphalia, where he hoped to find scope for carrying out his desire of taking part in missionary labours. At the instigation of the emperor, Louis le Debonnaire, he went to Denmark in the suite of some baptized Danish princes in 826, but after many disappointments and persecutions was compelled to leave this country, having met on this visit with but little success. About 830 he entered upon a missionary journey to Sweden, and in 831 or 832 received the archbishopric of Hamburg, which was founded as a point of support for the northern mission. Here also he had to contend with many difficulties, and on one occasion had to save himself by flight. In 847 the seat of the archbishopric was transferred to Bremen, where Ansgar could reside with more security. From this centre he again visited the Scandinavian territories and now with more success, baptizing converts in thousands. He died in 864 or 865, with the reputation of having undertaken, if not the first, the most successful attempts for the propagation of Christianity in the North. His prudence, the purity and warmth of his religious zeal, and the integrity of his life, are equally praised by all his contemporaries. The Catholic Church has placed him among the saints. His life was written by his successor Rombert, and forms the second volume of the Monumenta Germaniæ historica of Pertz.

ANSON, GEORGE, LORD, whose name shines in the annals of British navigation, was born on the 23d of April, 1697, at Shugborough manor, in Staffordshire, and entered early into the navy. In 1716 he served as second lieutenant under Sir John Norris, in the Baltic, and in 1717 and 1718 under Sir George Byng, against the Spaniards. In his twenty-seventh year he was raised to the rank of post-captain, and was for a long time on the South Carolina station. When, in 1739, the ministry considered a rupture with Spain as unavoidable, he was made commander of a fleet in the South Sea, directed against the trade and the colonies of that nation. The expedition consisted of five men-at-war and three smaller vessels, which carried 1400 men. Among the crews were 260 infirm old men, out-pensioners of Chelsea, whom official blundering had made him take on board. Anson left England with this squadron, September 18, 1740, and was attacked, on leaving the Straits of Le Maire, at the south end of Tierra del Fuego, by terrible storms, which prevented him from doubling Cape Horn for nearly three months. Separated from the rest of his squadron he reached, in June, 1741, the Island of Juan Fernandez, where three of his vessels rejoined him in a very miserable condition, having lost many men by sickness (scurvy). His own ship lost half her crew from the time of her leaving the Straits of Le Maire. After the health of his men had been restored in this delightful island he proceeded to the coast of Peru without waiting for the missing ships, made several prizes, and captured and burned the city of Paita. After a fruitless attempt to intercept the annual Manilla galleon he found himself obliged to burn not only a great part of his booty, but all except one of his vessels, in order to

equip that one, the *Centurion*, with which he made his retreat to Tinian, one of the Ladrones. Here the *Centurion* was blown out to sea while the commander was on shore. Upon this, much exertion was made to enlarge and fit out a small vessel found in the island. The return of his ship relieved him from this difficulty, and after some weeks of rest he sailed for Macao, where he formed a bold plan for taking the galleon of Acapulco. For this purpose he spread the report of his having returned to Europe, but in fact directed his course to the Philippines and cruised near the promontory Espiritu Santo. After a month the expected galleon appeared, which, trusting to its superiority, commenced the fight. But the British, although now greatly reduced in numbers, prevailed, and the galleon, with treasure to the amount of £500,000, was taken. With these acquisitions Anson returned to Macao, sold his prize, and then sailed for England. Passing undiscovered through the French fleet in the Channel, he arrived at Spithead, June 15, 1744, after an absence of three years and nine months, having meanwhile circumnavigated the globe. Not one of the 260 veterans returned. The treasure brought home was driven in triumph through the streets of London in a train of wagons. This perilous voyage through unexplored seas added much to geography and navigation. A few days after his return he was made rear-admiral of the blue, and not long after rear-admiral of the white; he also became a member of the admiralty board. In 1746, being now vice-admiral of the blue, he received command of the Channel fleet. His victory over the French admiral Jonquière, near Cape Finisterre in 1747, raised him to the peerage, with the title of Lord Anson, Baron of Soberton. Two of the prizes taken on this occasion were called *l'Invincible* and *la Gloire*, which induced the captain of the former to say, on giving up his sword, 'Monsieur, vous avez vaincu l'Invincible, et la Gloire vous suit' —'Sir, you have vanquished the Invincible, and Glory follows you'. From 1751 to 1756 he was first lord of the admiralty, and he was again appointed to this post in 1757. In 1758 he commanded the fleet before Brest, protected the landing of the British at St. Malo, Cherbourg, &c., and received the repulsed troops into his vessels. Finally, in 1761, as admiral of the fleet, he was appointed to convey the Queen of George III. to England. He died on June 1st, 1762. The narrative of his voyage round the world as written by himself, but edited by Mr. Walter, chaplain of the *Centurion* (with some assistance from Mr. Benjamin Robins), is a well-known work. His Life has been written by Sir John Barrow.

ANSPACH, or Ansbach, a town in Bavaria, capital of the circle of Middle Franconia, prettily situated at the junction of the Holzbach with the Lower Rezat, 24 miles south-west of Nürnberg. The building perhaps most worthy of notice is the castle, which formed the residence of the margraves of Anspach, and has fine gardens, which form an agreeable promenade. There are two fine old churches, and a courthouse of the sixteenth century. The manufactures include articles in wood, bone, straw, lace and embroidery, woollen yarn, cigars and tobacco, &c. Anspach gave its name to an ancient principality or margravate, which had a territory of about 1300 square miles, with 300,000 inhabitants, in the end of the eighteenth century. The last margrave sold his possessions in 1791 to Prussia; Prussia ceded Anspach to France in 1806, and in 1810 France transferred it to Bavaria. Pop. in 1905, 18,478.

ANSTEY, Christopher, English poet, was born in Cambridgeshire on Oct. 31st, 1724. He was educated at Bury St. Edmund's, whence he removed to Eton. He afterwards studied at King's College, Cambridge, where he graduated B.A. in 1746. In 1754 he succeeded to his patrimonial property and in 1756 married. He then resided for the most part at Bath. He had long cultivated poetry, but most of his early productions were Latin translations of English popular poems, one of which was Gray's Elegy. It was not until 1766 that his humorous production, the New Bath Guide, was published, which at once became highly popular for its pointed and original humour, and as usual led to numerous imitations. The New Bath Guide, which has sometimes been said to owe much to Smollett's Humphrey Clinker, preceded the latter work by four years, and the indebtedness, if any, was rather in the reverse direction. Anstey also wrote several other pieces, not specially successful, which are incorporated in an edition of his entire works, edited by his son (1808). He died on Aug. 9th, 1805.

ANSTRUTHER, Easter and Wester, two small burghs in Scotland, on the coast of Fifeshire, at the mouth of the Firth of Forth. They unite with St. Andrews, Crail, Cupar, Kilrenny, and Pittenweem in returning a member to Parliament. Anstruther Easter, the larger of the two, is the birthplace of Dr. Thomas Chalmers. Pop. 1187. Anstruther Wester has little trade. Pop. 476. The Anstruthers may be said to form one town with Kilrenny. Total pop. in 1881, 4712; in 1891, 4282; in 1901, 4205.

ANT, the name applied to various genera of Hymenopterous or Membranous-winged Insects, belonging to the section Aculeata, family Formicidæ. This race of insects, celebrated from all antiquity for singular instincts, industry, and foresight, would require a volume for the enumeration of all the curious and interesting circumstances observed by various naturalists in connection with them. To the works of Swammerdam, Réaumur, Kirby and Spence, Huber, Sir John Lubbock, &c., we must refer those who desire to be particularly informed on the subject. The observant Huber has in his work on ants rivalled his father's justly celebrated treatise on bees; whilst more recent works, such as Belt's Naturalist in Nicaragua, and Bates's Naturalist on the Amazons, give many interesting details regarding the life and habits of tropical species. Most of the species live in large companies or societies, composed of three sorts of individuals—males, females, and neuters. The males and females have long wings, which are not so much veined as in other insects of the same section, and are only temporary; the neuters, which are simply females with imperfectly developed reproductive organs, are smaller than the males and females, and are destitute of wings. The males and females are found in the vicinity of their habitation for a short time only, as they speedily mount into the air, where their sexual connection is consummated, after which the males perish, while the impregnated females, alighting on the ground, detach their wings by the aid of their feet, and commence the great work of their existence—the deposition of their eggs for the continuance of the species. The males are much smaller than the females, and have larger eyes, though the head and mandibles are proportionally smaller. The neuters have neither wings nor smooth eyes; their heads are large, their jaws strong, and their thorax compressed. In some ant-colonies, and particularly in the case of the White Ants or Termites (which, however, belong to a different order of insects from the Common Ants—see Neuroptera), the neuters exhibit a division into common or ordinary neuters, and *soldiers*—the latter provided with strong jaws, adapting them for protecting the community against the attacks of enemies. The neuters perform all the labours of the ant-hill; they excavate the galleries, procure food,

and wait upon the larvæ until they are fit to leave their cells, appearing always industrious and solicitous. They are apparently endowed with the power of communicating to each other, probably through the *antennæ* or feelers, the result of their searches after food, and thus obtain the co-operation of several where the strength of an individual would be insufficient. They feed the larvæ or young ants, which are destitute of organs of motion, with materials which they disgorge from their own mouths, and which seem to have undergone some preparation in their stomachs. In fine weather they carefully convey them to the surface for the benefit of the sun's heat, and as attentively carry them to a place of safety either when bad weather is threatened or the ant-hill is disturbed. In like manner they watch over the safety of the nymphs or pupæ about to acquire their perfect growth, some of which are in cocoons and some uncovered. When the time arrives at which the former are to undergo the final change they tear open the cocoons to permit them to escape. If the weather be unfavourable they detain those which have acquired their wings till a suitable opportunity offers, and then aid them to gain their liberty by the easiest route. There is a very considerable variety in the size and form of ant-hills or nests, according to the peculiar nature or instinct of the species. The greater number make their nests in the earth, under buildings, &c., where they excavate extensive galleries for the reception of their young, such dwellings being almost entirely concealed. But others (as in the case of the Termites) build their hills or nests of various substances, and form cones or domes of considerable size above ground. Some, again, prefer the trunks of old trees, in which they form the most singular labyrinths leading to the cells where the progeny are to be reared. These nests, whether above or under ground, have commonly a strong and acrid odour, which arises from the acid secreted by some of them from glands placed near the anal opening. This acid is known by the name of *formic acid*. It is not confined to the ant, but is found also in the poison of bees and wasps, in nettles, and may also be produced artificially. One among the most curious circumstances connected with the general history of ants is the exception to the general rule relative to the occupants of nests being individuals of the same species. Huber first observed, and his observations have since been amply confirmed, that the European Red Ant (*Formica sanguinea*) resorts to violence to obtain working ants of other species for their own use, thus actually making slaves of those they carry off to their nests. The neuters of these amazons regularly about the same hour, when the heat of the day begins to diminish, and for several successive days, advance in a dense mass towards the ant-hill they design to plunder; there, in spite of all the opposition made, they enter, seize on the larvæ and nymphs peculiar to this species, and carry them off to their own nest, where other neuters of the same species, but of full growth, take care of these kidnapped individuals as well as of the offspring of their vanquishers. *Polyergus rufescens* is also a slave-making species, and Latreille observes of this species that from the form of the jaws these ants are unable to procure food or to build habitations for themselves. Another exceedingly curious fact in relation to ants is the subserviency of the little insects called *aphides* or plant-lice (see PLANT-LICE) to their necessities. The aphides are remarkable for ejecting from little prominences on the posterior part of their bodies drops of limpid and sweet-tasted fluid. Not only do the ants profit by this when it is found on the leaves, but they know how to obtain it from the aphides at will. An ant approaches the aphis and begins very gently to touch it with his antenna over the sides and back as if caressing it. In a very short time the aphis raises its hinder limbs slightly, and from the orifices on its back a small clear drop exudes, which is greedily drunk up by the ant, which repeats the same treatment to several plant-lice until his hunger is entirely sated. These aphides have been appropriately called the *cows* of the ants, which in fact seem to regard them as their peculiar property, not only taking great care of them, but fighting for their possession. So fully sensible are they of their great value that some ants are said to carry the eggs of the aphides into their nests, where they take care of them till they are hatched. Some species of ants keep their aphides altogether underground, or at least during bad seasons, where they feed on the roots of plants; others build with clay small galleries from the ant-hills up trees, and even to the branches, upon which the aphides abound. Mr. Darwin has noted the interesting fact that when the plant-lice were stroked by any filament such as a hair they did not emit the sweet liquid, but on being stroked afterwards by the antennæ of the ants they at once emitted the desired secretion. Male and female ants survive, at most, till autumn, or to the commencement of cool weather, though a very large proportion of them cease to exist long previous to that time. The neuters pass the winter in a state of torpor, and of course require no food. This well-ascertained fact proves that their remarkable foresight has no other object than the continuance of the species by perfecting and securing their habitations. The only time when they require food is during the season of activity, when they have a vast number of young to feed. It would be well for mankind if ants derived all their nourishment from the aphides or from the dead bodies of other insects, small birds, &c. Unfortunately they are but too celebrated in most countries for their destructive operations among the grain, in gardens, pantries, and conservatories. Their larvæ and nymphs are in some parts of the world collected for the purpose of feeding pheasants and young turkeys. The bodies of small animals, skinned, and secured near an ant-hill, are soon converted by the ants into very neatly-cleaned skeletons. The pupæ of many species resemble grains of corn in appearance, and these pupæ, which are tended with great care by the ants, have undoubtedly in many cases been mistaken for grain carefully husbanded by the insects. The zoological characters of the ant family (Formicidæ), which includes the familiar ants, are found in the females being of larger size than the males; in the sexes being winged, whilst the neuters are wingless; and in the antennæ possessing a long basal joint. The genus *Formica* possesses no sting and distinctly developed eyes. The Red Ant (*F. sanguinea*) is a good example of this genus, as also are the *F. rufa*, or Wood Ant, and the Brown Ant (*F. fusca*). The genus *Myrmecia* (represented by the *M. forficata*, &c.) possesses a sting, and the footstalk of the abdomen is double jointed. The Giant Ant (*Ponera grandis*) also possesses a sting, but the neuters of this species have no eyes. (See plate accompanying the article ENTOMOLOGY.)

ANTÆUS, the giant son of Poseidon (Neptune) and Gē (the Earth), who lived in a cave in Libya and forced every stranger who arrived to fight with him. Whenever he was thrown to the earth his strength was restored by his mother. By this means he succeeded in killing his antagonists, and out of their skulls he built a house to Poseidon. But Heracles, whom he challenged to combat, perceiving the secret of his strength, grasped him in his arms and stifled

him suspended in the air. The tomb of Antæus near Tingis in Mauretania was shown down to a late period, and there was a belief that when any part of the earth covering it was removed rain fell until the hole was filled again. Sertorius is said to have opened the grave, but when he found the skeleton to be 60 cubits long he was horror-struck and instantly covered it again.

ANTANANARIVO. See TANANARIVO.

ANTARCTIC CIRCLE (from the Greek *anti*, opposite, and *arktos*, the constellation of the Bear) is one of the smaller circles of the sphere, parallel to the equator, and distant from the south pole 23° 30′. It consequently forms the parallel of lat. 66° 30′ s. —*Antarctic pole*, being opposite to the arctic pole, denotes the opposite end of the earth's axis, or the south pole. See SOUTH POLAR EXPEDITIONS.

ANT-EATER (*Myrmecophaga*, L.), a genus of Mammalia, belonging to the order Edentata. This peculiar group of animals is exclusively found in the southern part of the American continent, where they aid in diminishing the numbers of immense hordes of ants, which desolate the country in the vicinity of their dwellings. The whole head is remarkably elongated. The jaws are destitute of teeth, and the mouth is furnished with a very narrow, long, smooth tongue, by the aid of which they gather their prey. The saliva of the mouth is of a glutinous description, and also assists in the capture of the insects. Their limbs, especially the anterior, are very robust, and furnished with long, compressed, acute nails, admirably adapted for breaking into the hillocks containing their appropriate food. The most remarkable of the species whose habits are best known is the *Myrmecophaga jubata* (see plate inserted at CETACEA), or Great Ant-eater, sometimes called *Ant-bear*. This animal is 4 or 5 feet long, exclusive of the tail, which is about 3. The head and anterior extremities are covered with a brownish hair, which is mixed with white on the trunk and tail, the predominant colour being brown. On each side of the shoulders there is a black band between two white ones, which ascend towards the middle of the back, where the hair is elongated to form a sort of mane, which increases in length and thickness towards the base of the tail. The hair is flat at the end, and round for the rest of its length, somewhat resembling the hair of the deer. The fore-feet have four digits, with very strong claws, and the hind-feet five. The mammary or milk glands are two in number, and are situated on the breast. The Great Ant-eater leads a harmless and solitary life. In feeding it either thrusts its long narrow tongue, covered with the glutinous saliva, into the ant-heap, whence it withdraws it covered with the insects, or else, having partially demolished the hill by means of its fore-limbs, it transfers with wonderful celerity the alarmed inhabitants to its stomach by repeated and rapid extensions and retractions of the tongue. The flesh is eaten. Two other species have been long known, both of which have naked, scaly, and prehensile tails. These are the *Tamandua tetradactyla*, or Tamandua (about 3 feet in length, with a tail 16 inches long), and the Little Ant-eater (*Cyclothurus didactylus*), the latter (which is 15 inches in length) possessing only two toes on the front feet and four on the hinder feet. These latter species are adapted for climbing trees and for preying upon ants which make their nests in such situations. The Two-toed Ant-eater brings forth but a single young one at a birth on a bed of leaves prepared in a hollow tree. The Tamandua is of a lighter brown colour than the Great Ant-eater, whilst the Little Ant-eater is also coloured of a light brown hue, and possesses a fur of a fine silken character. All the ant-eaters are slow in their movements, and the two smaller species are especially helpless when on the ground, though they defend themselves bravely when attacked.

ANTECEDENT. As used in logic, this word is applied in opposition to consequent, first, to the part of a hypothetical proposition which contains the supposition, for example, to the first member of the proposition: 'If this blunder had not been made the accident would not have happened;' and, secondly, to the premisses of a syllogism. In grammar the antecedent is the word to which a relative pronoun refers; and in mathematics, means the first term of a ratio. In this last case it is often used in the plural. Thus, when four terms are proportional, both the first and the third are called the *antecedents*.

ANTELOPE, the name given to the members of a large family of Ruminant Ungulata or Hoofed Mammalia, closely resembling the Deers in general appearance, but essentially different in nature from the latter animals. The Antelopes are included with the Sheep and Oxen in the family of the Cavicornia or 'Hollow-horned' Ruminants. Their horns, unlike those of the Deer, are not deciduous, but are permanent, each consisting essentially of a process of the frontal bone—the *core* of the horn—covered by a *sheath* of horny material. Only in one antelope (the Prongbuck or Antilocapra) is the sheath of the horn shed annually. The horns are further distinguished from those of the Deer by being of simple nature, and by being usually of twisted or spiral shape. The horns of the Deer, on the other hand, are usually much branched. Both sexes in the Antelopes may possess horns, whilst in some species these organs are borne by the males alone. A beard or 'dewlap,' such as exists in oxen, is rarely found in the Antilopidæ, and lachrymal sinuses or tear-pits are commonly developed. Inguinal pores or sacs, existing in the groin, and secreting a viscid substance, supposed to be connected with the generative function, are also found in antelopes. As regards their distribution these animals are allocated to Africa as their head-quarters; and it is curious to remark that Deer are, with one or two exceptions, entirely absent from this great continent, in which the Antelopes therefore represent these animals. The best-known genera of Antelopes are the Chamois of the Alps, which is the only European species; the Gazelle; the Eland; Hartebeeste; Gnu; and the Prongbuck of America. (See plate at article UNGULATA.)

ANTENNÆ, the name given by naturalists to the movable jointed organs of sensation attached to the heads of the majority of the Articulata, and commonly called horns or feelers. In the Crustacea there are two pairs; in the Myriapoda and Insecta there is one pair; and in the Arachnida, the remaining one of the four great classes into which the Articulata are divided, they are wanting, or not developed in the same way as in the other three classes. In Latin the word *antennæ* signifies the yards of a ship.

ANTEQUERA, a city of Andalusia, in Spain, in the province of Malaga, on the northern slope of the Sierra Cabras, 29 miles N.N.W. of Malaga. It was a place of some importance under the Romans, and contains a Moorish castle built on Roman foundations. The regent Fernando, having wrested the town from the Moors in 1410, obtained the surname of El Infante di Antequera. Its chief manufactures are woollens, earthenware, and leather. Pop. 31,609.

ANTEROS, in mythology, the god of mutual love. The later mythology says, that as soon as Eros, the god of love, was grown up, his mother bore Anteros to Arēs (Mars), a fiction which indicates that love must be mutual. According to some, however, Anteros is the enemy of love, or the god of antipathy.

ANTHELMINTICS, remedies for worms in the intestines. See WORMS, INTESTINAL.

ANTHOLOGY (Greek, from *anthos*, a flower, and *legein*, to gather, equivalent to the Latin *florilegium*) is the name given to several collections of short poems which have come down from antiquity. The Greek anthology is the most celebrated, and contains the choicest flowers. The first who compiled a Greek anthology was Meleager, a Syrian, about 60 B.C. He entitled his collection, which contained selections from forty-six poets besides many pieces of his own, the Garland; a continuation of this work by Philip of Thessalonica in the age of Tiberius was the first entitled Anthology. It contained specimens of thirteen later writers. Diogenianus of Heraclea, Strato of Sardis, both under Hadrian; and Agathias, in the sixth century, made new or supplementary collections. But all these ancient collections are lost. We now possess two of a later period, the one by Constantine Cephalas, in the tenth century, who in his collection made much use of the earlier ones, particularly that of Agathias; the other by Maximus Planudes, in the fourteenth century, a monk of Constantinople, whose anthology is a tasteless series of extracts from the Anthology of Cephalas, with some additions. The Anthology of Planudes was long the only one known; that of Cephalas, which has been preserved in a single copy, having remained unknown till discovered by Salmasius in the Heidelberg Library in 1606. It was afterwards carried to Rome, and thence to Paris, but was restored to Heidelberg in 1816. The most complete edition of this original text is that of Jacobs (Leipzig, 1813–17, three vols.). The treasures contained in both, increased with fragments of the older poets, idyls of the bucolic poets, the hymns of Callimachus, epigrams from monuments and other works, were published by Brunck in his Analecta Veterum Poetarum Græcorum (Strasburg, 1776), and by Jacobs with a commentary, in his Anthologia Græca (Leipzig, 1794–1814, thirteen vols.), Brunck's text being retained in the latter. The Greek anthology has attracted many translators, and the rich poetical vigour, the delicacy of feeling, the sportive gaiety, the noble and elevated thoughts displayed in these little pieces, have secured for them a deserved admiration. No Latin anthology has come down to us from ancient times; and such collections of Latin poems as we possess, similar in character to the Greek anthologies, we owe to modern scholars. The first of these collections was Scaliger's Catalecta Veterum Poetarum (Leyden, 1573). Peter Burmann, the younger, made use of all the existing materials in the compilation of his Anthologia Veterum Latinorum Epigrammatum et Poematum (two vols., Amsterdam, 1759–73), enlarged and improved by Meyer (Leipzig, 1835, two vols.). A more recent and fuller edition of the Greek anthology is that of Dübner and Cougny (Paris, three vols., 1864–90); of the Latin, that of Bücheler and Riese (two vols., 1869–97). Mackail's Select Epigrams from the Greek Anthology (1906), texts and translations, &c. is excellent.

ANTHOZOA, a name for the sea-anemones and kindred animals. See SEA-ANEMONE.

ANTHRACENE ($C_{14}H_{10}$), a solid hydrocarbon, occurring among the products of the dry distillation of coal. It forms shining colourless scales, having a specific gravity of 1·47. By boiling with dilute nitric acid anthracene is oxidized, yielding oxanthracene or anthraquinone ($C_{14}H_8O_2$). See ALIZARINE.

ANTHRACITE, or BLIND-COAL, so called from the Greek *anthrax*, charcoal, differs from common coal only in containing no bituminous matter, and consequently yielding no flame. It is found in small quantities in the primary strata of most countries, but its proper geological position is among the ordinary coal-measures, where whole basins of workable coal are sometimes almost entirely composed of it. It occurs at various parts of the United Kingdom, and is especially common in the coal-fields of South Wales, but it is most abundant in the extensive coal-fields of Pennsylvania. It is composed of almost pure carbon.

ANTHRAX, a fatal disease to which cattle, sheep, horses, camels, and other animals are liable, always associated with the presence of an extremely minute micro-organism or disease germ, the *Bacillus anthracis*, in the blood. It frequently assumes an epizootic character, affecting all classes of animals liable to its attacks. It is also known as *splenic fever*, *splenic apoplexy*, &c., and is communicable to man through the disease poison entering the blood, being then generally known as *wool-sorter's disease* or *malignant pustule*. See GERM THEORY.

ANTHROPOLOGY (from Greek *anthrōpos*, man, and *logos*, doctrine), the science or study of man, a science or branch of knowledge which deals with mankind in its most general aspects and characteristics, and as forming an organic whole. Anthropology derives its materials from the most varied sources, and rests upon numerous other sciences or branches of knowledge, among which, for instance, may be mentioned anatomy, physiology, psychology, ethnology, archæology, philology, mythology, ethics and the study of religion, esthetics, the rise of arts and science, and the history of civilization. Anthropology has to take account of the totality of the moral and physical characteristics of man and of the different races of man, including their capability for labour, their mental endowments, their dispositions, their manners and customs, language, religion, &c. It deals with the ethnological relationship which exists between the races of former times and those now living, treats of man's place in nature, and attempts to determine in what relation he stands to the animals whose structure most nearly approaches his own, and whether the theory of evolution and development from lower to higher forms can be applied to man. The how, when, and where of man's first appearance on the earth, the condition in which he originally existed, and the influences, means, and methods which have given rise to existing civilization; the origin of marriage, and of family, tribal, and social life generally, have all to be considered by anthropology. See the articles ARCHÆOLOGY, CIVILIZATION, ETHNOLOGY, MAN, &c.

ANTHROPOMETRY. See SUPPLEMENT.

ANTHROPOMORPHISM, the representation or conception of the Deity under the form of a man (from the Greek *anthrōpos*, man, and *morphē*, form), and the attribution to God of feelings, passions, and actions which belong to men. Much of the phraseology of Scripture is anthropomorphic, as when the arm, the hand, the ear of God is spoken of, or when he is spoken of as hating, repenting, being wroth, &c.; and heresies crept early into the church from the too literal interpretation of such language. The *Anthropomorphites* in ecclesiastical history, called also *Audians*, were the followers of Audius, a teacher in Syria, who was banished to Scythia, introduced Christianity among the Goths, and died about 370 after Christ. They were excommunicated by the orthodox church, rather on account of their persevering in the old way of celebrating Easter at the same time with the Jewish Passover, their deviation from the usual penances, and their zeal against unworthy priests, than on account of their representation of God as possessing a human shape. The heathen religions are almost always strongly anthropomorphic; the gods of the Greeks and Romans, for instance, differed from men only in the possession of immortality and

superior mental and physical power. A certain amount of anthropomorphism in language is unavoidable, since we can only speak of the spiritual world through analogies derived from the sensible world.

ANTHROPOPHAGI (from Greek *anthrōpos*, man, and *phagein*, to eat), man-eaters, cannibals. The practice of eating human flesh, unnatural as it may seem to us, is found to prevail among some nations. In some cases hunger, in others revenge, in others superstition, is the motive; at least it is reported that the Mexicans used to eat the flesh of the victims whom they had sacrificed to their idols. In some instances a horrid desire for human flesh appears to have been occasioned by disease, like other perversions of the appetite. Thus a cow-herd, named Goldschmidt, who had committed a murder, and in order to prevent discovery had cut the body in pieces, is said to have felt a craving for human flesh arise within him, and after devouring the body of the murdered man, to have killed an infant expressly for the purpose of gratifying his unnatural longing. Boece reports, in his History of Scotland, an instance in which this disease seized a whole family. A robber, his wife and children, were burned, because they had killed and eaten several persons whom they had enticed into their dwelling. Only one daughter, who was very young, was left alive; but scarcely had she reached her twelfth year when she was executed for the same crime. That there are nations who eat the flesh of enemies slain in battle, for example the Niam-Niam of Central Africa, and till recently the New Zealanders, is well known; but there are none who make human flesh their usual food. The Battas of Sumatra are said to devour criminals as well as captives taken in war. The Caribs are said to have been cannibals at the time of the Spanish conquest of America, and the word 'cannibal' is believed to have been derived from their name.

ANTIBES, a town and seaport of southern France, in the department of Alpes-Maritimes, on the Mediterranean, 11 miles S.S.W. of Nice. The harbour is not large, but is safe and easy of access. The only buildings worthy of notice are the parish church, which stands on a rock overhanging the town, and the town-house. The environs are covered with gardens, vineyards, and orchards, and produce excellent olives, figs, oranges, and other fruits. The manufactures consist of pottery, hats, oil, and essences of flowers, while sardines and anchovies, &c., are preserved. There is a considerable export and import trade. Antibes was founded under the name of *Antipolis* by Greek colonists from *Massilia* (Marseilles) about 340 B.C. The Romans enlarged it, and built numerous public buildings. Traces of the circus and part of an aqueduct still remain; and inscriptions, urns, lamps, &c., have been found. Pop. (1906), 7952.

ANTICHLOR, the name given to any chemical substance employed to remove the small quantity of chlorine which obstinately adheres to the fibres of the cloth when goods are bleached by means of chlorine. (See BLEACHING and CHLORINE.) The chlorine, if allowed to remain, would slowly cause the fibres to rot, and therefore must be removed. The most commonly employed antichlor is hyposulphite of sodium. By the action of this substance on chlorine sulphate and chloride of sodium are produced, which may be readily removed by washing.

ANTICHRIST, a word occurring in the first and second epistles of St. John, and nowhere else in Scripture, in passages having an evident reference to a personage real or symbolical mentioned or alluded to in various other passages both of the Old and New Testaments. A similar expectation of a great adversary of the Messiah or Christ was entertained both by the early Christians and the later Jews, and had an evident origin in their common Scriptures. The prophecies of Daniel in particular may be regarded as the primary source of the distinct idea of such an antagonist of the revealed religion. In the New Testament the discourses of our Lord, the epistles of St. Paul and St. John, and the Apocalypse, contain the most explicit and detailed references to this subject. The widest possible diversities of opinion have resulted both in theological exposition and in the more popular anticipations which have come within the range of history from these intimations. In every age the church has held through all its sects some definite expectation of a formidable adversary of truth and righteousness prefigured under this name, and in every age each sect has regarded this great adversary of the truth as its own adversary in particular. Thus Catholics have found Antichrist in heresy, and Protestants in Romanism. In the early contentions of the church, likewise, while its doctrines were still unsettled, similar aspersions were made by the rival sectaries against each other. In one point, however, all sects of Christians have been agreed, namely, in regarding the various intimations on this subject in the Old and New Testaments as a homogeneous declaration or warning inspired by the spirit of prophecy of danger to the true religion from some spirit of disaffection and revolt organized in the latter days by Satan, the great adversary of God and man. Modern critics take a different view of the matter. They do not regard the various Scriptural writers who have dealt with this subject as having had any common inspiration or design. As far as there is any coincidence among them, it is a mere coincidence of imitation. Each writer from his own point of view, guided by mere human sagacity, gives expression in his predictions to his own individual apprehensions, or narrates as prediction what he already knows. It is the near political horizon which suggests the danger, or contemporary history the substance of the prophecy; thus the Antichrist of Daniel is Antiochus Epiphanes, that of St. John Nero, that of St. Paul some adversary of Christianity about to appear in the time of the Emperor Claudius. A careful examination of the Scripture texts will best enable an impartial reader to judge between these two views. The differences of detailed interpretation are quite as formidable in the modern critical as in the ancient ecclesiastical school.

ANTICOSTI, a large and sterile island, belonging to the Dominion of Canada, in the mouth of the St. Lawrence, 125 miles long by 30 miles broad. The coasts are dangerous, but several lighthouses have been erected. The interior is mountainous and wooded. The island was purchased by M. Menier, of chocolate fame, in 1895. Pop. 253.

ANTICYRA, the name of two towns of Greece, the one in Thessaly the other in Phocis, famous for the hellebore which grew in their neighbourhood. This plant was in high repute as a medicine, and was thought to have the effect of clearing the brain and curing stupidity; hence the expression of Horace, *Naviget Anticyram*, 'Let him sail to Anticyra.'

ANTIDOTE, derived from the Greek words *anti*, against, and *didonai*, to give, may be generally employed to designate everything which has a counteractive tendency, and was accordingly at one time given to every substance employed in curing disease. Its meaning, however, is commonly more restricted, and it now is confined to the remedies employed to neutralize the effects of venomous bites and poisons. Great numbers of those much in vogue among the ancients have been exploded; but many others of true value have been discovered during the progress of chemical science.

ANTIGONE, in Greek mythology, a daughter of Œdipus and Jocasta, sister of Eteocles and Polynices, and a heroine of ancient tragedy. For her history see the articles ETEOCLES and ŒDIPUS. Sophocles has immortalized her in his Œdipus at Colonus and his Antigone. She is also the heroine of Racine's early tragedy Les Frères Ennemis.

ANTIGONISH, a town in the east of Nova Scotia, in a county of same name; the seat of a Roman Catholic bishop, with a cathedral, a college, and a good harbour. Pop. (1891), 693; (1901), 1526.

ANTIGONUS, one of the generals of Alexander, born about 382 B.C. When, after the death of Alexander, his generals divided his conquests among themselves, Antigonus obtained the Greater Phrygia, Lycia, and Pamphylia. Perdiccas, who strove to unite all the states of Alexander under his own dominion, and who feared the energy of Antigonus, accused him of disobedience to the commands of the late king. Antigonus saw through his intentions, embarked secretly for Europe, and connected himself with Craterus and Antipater, B.C. 321. These three then, together with Ptolemy, declared war against Perdiccas. The latter was killed by his own soldiers. Eumenes, the general of Perdiccas, was still, however, very powerful in Asia. Antigonus continued the war against him alone, got him into his power, and put him to death. Thus, in a short time, he became master of almost all Asia; for Seleucus, who reigned in Syria, and had endeavoured to oppose his usurpations, was likewise overpowered by him, and sought shelter with Ptolemy. Antigonus possessed himself also of the greater part of the treasures of Alexander at Ecbatana and Susa, but would not render an account of them to Ptolemy, Cassander, and Lysimachus, and even declared war against Cassander, in order to revenge, as he said, the death of Olympias, and to deliver the young Alexander, who lived with his mother Roxana at Amphipolis. Alarmed by his ambition, all these generals united themselves against him; and a long series of contests ensued in Syria, Phœnicia, Asia Minor, and Greece, ending in 301 B.C. with the battle of Ipsus in Phrygia, in which Antigonus was defeated and slain (aged eighty-four years) by his former allies Ptolemy, Cassander, and Lysimachus.—Among other distinguished persons of this name we may mention ANTIGONUS GONATAS, the son of Demetrius Poliorcetes, and grandson of the above. At his father's death he succeeded him in the kingdom of Macedon, and all his other European dominions. He died after a reign of forty-four years B.C. 239, at the age of eighty. Demetrius II. succeeded him.—ANTIGONUS II., surnamed *Doson*, king of Macedonia, the son of Antigonus I., succeeded his brother Demetrius II., B.C. 229. He was properly only guardian of the kingdom, but assumed the crown in his own right. Being chosen commander-in-chief of the Achæan forces he defeated Cleomenes, king of Sparta, at Sellasia. He died the same year, B.C. 221.

ANTIGUA, one of the British West Indian Islands, the most important of the Leeward group, 50 miles east of St. Kitt's, and the same distance north of Guadeloupe. It is about 28 miles long, 20 broad at its broadest part, and has an area of 108 square miles. Its shores are high and rocky, giving but little promise of the beauty to be found within, consisting of hill and dale, green fields, gorgeous flowers, and cliffs festooned with elegant tropical plants. The shores are indented on all sides by harbours, bays, and creeks, and surrounded on the north and east with many rocky islets. The island rises nowhere above 1500 feet. The best harbour is English Harbour, in the south, which has a dockyard and is the mail steam-packet station. The capital, St. John (pop. 9738 in 1891), the residence of the governor of the Leeward Islands, stands on the shore of a well-sheltered harbour in the north-west part of the island. The climate is healthy, but the island is subject to great hurricanes, and there is a scarcity of water. The only staple product of the island is sugar, the continued low price of which has greatly depressed the prosperity of the colony. Latterly the cultivation of cotton has been taken up, and considerable and increasing quantities of it are now exported. Antigua was discovered by Columbus in 1493. The first settlement was made, in 1632, by a few English families. In 1663 Charles II. granted it to Lord Willoughby. In 1666 a French expedition, uniting with the Caribs, invaded the island and laid waste the settlements. The island was resettled a few years afterwards, through the enterprise of Colonel Codrington, of Barbados, who was appointed commander-in-chief of the Leeward Islands. Antigua is included in the Federation of the Leeward Isles, consisting of Antigua, Barbuda, Redonda, Montserrat, St. Christopher, Nevis, Anguilla, the Virgin Isles, Dominica, and Sombrero. The government of the colony of Antigua, which includes also the islands of Barbuda and Redonda, is vested in a governor and council. Pop. (including Barbuda and Redonda) in 1891, 36,819; in 1901, 35,073.

ANTI-LEBANON. See LEBANON.

ANTILLES, another name for the West Indies (which see).

ANTIMACHUS, a Greek poet, native of Claros, a dependency of Colophon, who lived about the time of Plato. His principal poems were an epic of interminable length called the Thebais, and a very long elegy called Lyde, inspired by a mistress of that name. Both works were full of mythological lore, but probably exhibited more learning than genius. The Alexandrian grammarians placed Antimachus next to Homer, and the Emperor Hadrian preferred him to that great poet. The extant fragments of his works are contained in Kinkel's Epicorum Græcorum Fragmenta (1876), and Bergk's Poetæ Lyrici Græci.

ANTIMONY, symbol Sb. (from the Latin *stibium*), atomic weight 120, is a bluish-white, brittle metal, of a scaly or foliated texture; it has a brilliant lustre, and does not readily become tarnished by exposure to the air; its specific gravity is 6·7. By exposure to heat it melts, and, becoming oxidized, rises in dense white fumes of the oxide Sb_2O_3, formerly called *argentine flowers of antimony*. Antimony forms with oxygen three oxides—trioxide (Sb_2O_3), tetroxide (Sb_2O_4), and pentoxide (Sb_2O_5). The hydrates of the first and last possess acid properties, and form two series of salts called *antimonites* and *antimonates* respectively. The group SbO, although unknown in the free state, appears to enter into the composition of certain salts, chief among which stands *tartar emetic*, a tartrate of antimony and potassium, $K(SbO)H_4C_4O_6$. This salt is manufactured on the large scale by mixing 1 lb. of *glass of antimony* (a compound of oxide and sulphide of antimony) with 1 lb. of cream of tartar, and boiling the mixture in a gallon of water for an hour or two; it is then filtered, evaporated, and set to crystallize. Tartar emetic is the most generally used antimonial medicine. Antimony is found in its metallic state in minute quantities in several countries, and in occasional mixture with ores of silver, lead, and copper; but it is from its combination with sulphur, in which state it occurs frequently in Auvergne, Scotland, and Hungary, that the antimony of commerce is furnished. This mineral, the sulphide of antimony, is found in compact, foliated, and radiated masses, as well as in distinct rhombic prisms. Its colour is a light lead-gray; it is dull, and often iridescent. Specific gravity, 4·3. It melts in the flame of a candle; and before the blow-

pipe, on charcoal, is wholly evaporated, with a sulphureous odour. When pure it is composed of antimony 72·86 and sulphur 27·14, and in its composition exactly resembles the artificial compound which possesses the same properties, having the formula Sb_2S_3. To obtain the crude antimony of commerce the above ore is reduced to fragments, and put into large earthen pots, with holes in their bottoms, and these are inserted into other similar vessels; heat is applied to the upper vessels, which causes the sulphide of antimony to separate from its stony gangue and flow into the lower vessels, which are kept cold; here it concretes into fibrous, crystalline masses, without having undergone any chemical change during the process. In this condition it often contains some iron, lead, and copper. From this substance the regulus of antimony is prepared by roasting the sulphide of antimony in a reverberatory furnace until it forms a gray oxide, a hundredweight of which is afterwards mixed with 8 or 10 lbs. of argal or crude tartar, and smelted in large melting-pots in a wind-furnace. It also affords, by calcination and subsequent fusion in earthen crucibles, the glass of antimony, which is of so much importance in the preparation of tartar emetic. The kermes mineral, a popular medicine, is likewise prepared from the sulphide of antimony, by boiling crude antimony and pearl-ashes; the kermes mineral is deposited in the form of a purplish-brown powder. The supernatant liquid, on the addition of any acid, yields an orange sediment, called *golden sulphide of antimony*, which is used by the calico-printers as a yellow colour.

ANTINOMIANISM ('opposition to the law'), the name given by Luther to the inference drawn by one of his followers, John Agricola, from the doctrine of justification by faith, that the moral law is not binding on Christians as a rule of life. Agricola did not intend to disparage morality, and the difference between him and Luther, which seems to have been mostly verbal, was at least partially reconciled. The term antinomian has since been applied both currently and retrospectively to all doctrines and practices which seem to contemn or discountenance strict moral obligations. The teaching of the ancient Gnostics is charged with antinomianism on the ground that their leading teachers held that some men were created evil and were incapable of salvation; others of celestial origin must finally be saved, however licentious their lives might be. The Lutherans and Calvinists in modern times have likewise been charged with antinomianism, the former on account of their doctrine of justification by faith, the latter both on this ground and that of the doctrine of predestination. The charge is, of course, vigorously repelled by both.

ANTINOUS, a young Bithynian, whom the extravagant love of Hadrian has immortalized. He made him his page and took him with him on all his journeys. Whether he threw himself into the Nile with the intention of preserving the life of Hadrian, or because weary of his own life, is not decided. Hadrian set no bounds to his grief for his loss. Not satisfied with giving the name of his favourite to a newly-discovered star in the galaxy, which appellation is still preserved, he erected temples in his honour, called cities after him, and caused him to be adored as a god throughout the empire. His image was therefore represented by the arts in every way. Several of these figures belong to the finest remains of antiquity, particularly the Antinous in the Vatican, found in the baths of Hadrian; and the Antinous of the Capitol, found in the villa of Hadrian at Tivoli. Antiquaries, however, differ much in opinion concerning these statues, and many will not allow them to be images of Antinous, but recognize in them the characteristics of certain heroes or gods. This dispute is difficult to be decided, because the artists who represented Antinous as a god chose divine ideals, to which they gave his features. The Vatican statue which goes under his name is probably a Hermes, the Capitoline probably a Hermes-Antinous. 'In all the figures of Antinous,' says Winckelmann, 'his countenance has something melancholy; his eyes are always large, with good outlines; his profile gently descending; and in his mouth and chin there is something expressed which is truly beautiful.'

ANTIOCH (ancient, *Antiochia*), a famous city of ancient times, the capital of the Greek kings of Syria, finely situated on the left bank of the Orontes, about 21 miles from the sea, in a beautiful and fertile plain. It was founded by Seleucus Nicator, in 300 B.C., and was named after his father Antiochus. The first inhabitants were brought from the neighbouring and unfinished city of Antigonia, founded by Antigonus, in 307. It was famed for the number and splendour of its public buildings, the Seleucid monarchs having vied with each other in embellishing their metropolis, and the Roman emperors having also done much to adorn it. It was called the 'Queen of the East' and 'The Beautiful,' and it was advantageously situated for trade, being easily approached by the caravans of the East, and through its port Seleucia having maritime communication with the West. Its inhabitants were celebrated for their luxury and effeminacy, their love of frivolous amusements, and their propensity to ridicule and scurrilous wit. Antioch is frequently mentioned in the New Testament, and it was here that the disciples of our Saviour were first called Christians (Acts xi. 26). Few places have undergone so many calamities as Antioch. Earthquakes repeatedly visited it, and on one or two occasions almost destroyed it. In B.C. 64, on the breaking up of the Kingdom of Syria, it was captured by Pompey; in 266 it was captured by the Persians under Sapor; and in 538 it was thrown into a heap of ruins by the Persians under Chosroes. It was restored by the Emperor Justinian, but never quite recovered this last blow. In the first half of the seventh century it was taken by the Saracens, and remained in their possession for upwards of 300 years, when it was recovered by the Greek Emperor Nicephorus Phocas. In 1084 it was again taken by the Saracens, and remained with them till 1098, when it was taken by the Crusaders. They established the principality of Antioch, of which the first ruler was Bohemond, and which lasted till 1268, when it was taken by the Mameluke Sultan of Egypt. In 1516 it passed into the hands of the Turks. The modern Antioch or *Antakieh* occupies but a small portion of the site of the ancient Antioch. It is a poor place, with narrow, dirty streets, and houses mostly of one story. It has some manufactures of silk-stuffs, leather, and carpets, and has some trade in these articles and in goats' wool, bees'-wax, &c. The population is not known with exactitude, but it was estimated in 1895 at about 25,000.

ANTIOCHUS, a name of several Syrian kings of the dynasty of the Seleucidæ (see SELEUCIDÆ), some of them important in Roman history. The ancestor of the dynasty, a Macedonian, and general of King Philip, was father of the famous Seleucus, by his wife Laodice. ANTIOCHUS SOTER, son of Seleucus, was born about B.C. 324. It is said that he fell in love with his stepmother Stratonice, and his father discovering his passion, abandoned her to him. He gave him at the same time the title of king, with the command of Upper Asia. He succeeded his father in B.C. 280. He disputed Macedonia with Antigonus Gonatas, but finally relinquished it to him. During the greater part of his reign he was engaged in a

protracted struggle with the Gauls, by whom he was killed in battle B.C. 261.—ANTIOCHUS II., surnamed *Theos*, succeeded his father in the year above named. Weakened by war with Egypt, he lost Parthia and Bactria by revolt. He was murdered in B.C. 246 by Laodice, his wife, whom he had put away to marry Berenice, daughter of Ptolemy.—The most famous of the name, ANTIOCHUS III., surnamed the *Great*, succeeded his father Seleucus Callinicus in B.C. 223, at the age of fifteen. He made war with Egypt to recover Cœle-Syria, Palestine, and Phœnicia, but after some early successes he was defeated in the battle of Raphia, and made peace by the cession of his provinces (B.C. 217). He made war on Parthia and Bactria, which in previous reigns had absorbed some of the eastern provinces of Syria; but was compelled, after a long war, to recognize the independence of these kingdoms. He next invaded India, where he remained for seven years (B.C. 212–205). He made an agreement with Philip V., king of Macedonia, to divide the dominions of Ptolemy Epiphanes of Egypt, then a minor, and thus obtained possession of Palestine and Cœle-Syria. He afterwards restored these provinces as a dowry to his daughter, whom he married to Ptolemy. He then invaded Asia Minor, and, crossing to Europe, took possession of the Thracian Chersonese. Here he encountered the Romans, who had conquered Philip of Macedon, and were prepared to resist his further progress. They demanded the surrender of all his conquests from Macedonia and Egypt. Antiochus gained an important ally in Hannibal, who had fled for refuge to his court; but he lost the opportunity of an invasion of Italy while the Romans were engaged in war with the Gauls, of which the Carthaginian urged him to avail himself. In 192, at the request of the Ætolians, he crossed to Greece, but was defeated by the consul Acilius Glabrio, and returned to Asia. The defeat of his fleets also led him to sue for peace, but the conditions of the Romans were too hard for his acceptance. He was defeated again by Scipio at Mount Sipylus, near Magnesia, B.C. 190. Peace was granted him in B.C. 188 on the cession of all his dominions west of Mount Taurus, with a heavy indemnity in money, elephants, and ships of war. He also engaged to surrender refugees at his court, but he allowed Hannibal, of whose assistance he had made little use, to escape. Armenia now revolted and became independent. He was killed in 187 while plundering a temple in Elymais to procure money to pay the Romans.—ANTIOCHUS EPIPHANES, the fourth of the name, is chiefly remarkable for his attempt to extirpate the Jewish religion, and to establish in its place the polytheism of the Greeks. This led to the insurrection of the Maccabees, by which the Jews ultimately recovered their independence. He died B.C. 164, in a state of raving madness, which both Jews and Greeks attributed to his sacrilegious crimes.

ANTIPAROS (ancient *Oliaros*), one of the Cyclades group of islands in the Grecian Archipelago, containing a famous grotto or cave. It lies south-west of Paros, from which it is separated by a narrow strait, and has an area of 10 square miles, and about 500 inhabitants. The grotto is situated in a high hill about 2 miles from the sea, and is 1000 feet under the ground. The principal cavern is over 300 feet in length and breadth, and 80 feet high. It is an immense marble arch, the roof and sides of which are covered with stalactites and innumerable crystallizations, assuming the various figures of columns, screens, ramifications of trees, and festoons of flowers, and presenting a scene of magnificence which dazzles the eye, and seems almost to realize the idea of the enchanted halls of fable.

ANTIPASCHIA, among ecclesiastical writers, denotes the first Sunday after Easter. It is also called *Dominica in albis* and *Low Sunday*.

ANTIPATER, a general and a confidential friend of Philip of Macedon, father of Alexander the Great. Alexander left him governor of Macedonia when he went to Asia (B.C. 334). On the death of Alexander, in 323 B.C., Antipater received Macedonia and Greece in the well-known division of the empire, and was appointed guardian of the child with which Roxana, Alexander's widow, was then pregnant. Soon after he was involved in a war with all the powers of Greece. At first he was unsuccessful; but when Leonnatus and Craterus came to his assistance the Greeks again submitted (B.C. 323). This war was followed by another with Perdiccas, which terminated as happily. Antipater died in B.C. 317, at an advanced age, having confided the regency to Polysperchon, to the exclusion of his son Cassander.

ANTIPATHY, a special dislike exhibited by individuals to particular objects or persons, usually resulting from physical or nervous organization. Some antipathies are merely the result of habit or education. These can be removed by counter habits or training, but those which depend on physical organization are commonly ineradicable.

ANTIPHLOGISTIC, a term applied to medicines or methods of treatment that are intended to counteract inflammation, such as blood-letting, purgatives, diaphoretics, &c.

ANTIPHON, a Greek orator, born near Athens in B.C. 480, studied under Gorgias, afterwards taught rhetoric, and numbered Thucydides among his pupils. He made his art subservient to the practical object of conviction rather than seeking to dazzle by mere brilliancy, as was taught by the school of Gorgias. He was the first of the ten great Attic orators, and is said to have been the first who wrote speeches for money. He was put to death for joining in the revolution of B.C. 411, which established the oligarchic government of the Four Hundred. His extant orations number fifteen, of which three were composed for others. The remainder all relate to fictitious cases.

ANTIPHON, ANTIPHONY ('alternate song'), in the services of the Christian church, a psalm, chant, or other piece, sung by two parties in alternation, as by two choirs or parts of a choir, or first sung by a single voice and then repeated by the whole choir. The Roman Church applies the term antiphon in a restricted sense to a series of 'words or verses prefixed to and following a psalm or psalms, to express in brief the mystery which the Church is contemplating in that part of her office'. The practice of alternate singing formed a part of the old Jewish worship. Its introduction into the Christian church is ascribed to Ignatius, in the first century after Christ. The Western Church is said to have received it more particularly from Saint Ambrose. See CHANT in SUPP.

ANTIPODES, the name given to those inhabitants of the earth who are diametrically opposite to each other, and of course turn their feet towards each other; or to any part of the earth's surface situated diametrically opposite any given part. The name comes from the Greek *anti*, against, and *pous* (*podos*), a foot. The antipodes live in similar and, except at the equator, opposite latitudes, and their longitudes differ by 180°. Hence the difference in their time is about twelve hours, and their seasons are reversed. The spherical form of the earth naturally leads us to the idea of the antipodes, of whose existence some idea was entertained even before the age of Cicero. Some leaders of the church, however, found in this theory a contradic-

tion of the Bible, and in the eighth century Virgilius, archbishop of Salzburg, was excommunicated for maintaining it. Circumnavigators of the globe first put the question beyond all doubt, and any opposition to the doctrine of the sphericity of the earth, or to the existence of the antipodes, is now maintained only by the puzzle-headed.

ANTIPOPE, the name applied to those who, at different periods, have produced a schism in the Roman Catholic Church by opposing the authority of the pope, under the pretence that they were themselves popes. This is the Catholic explanation, because it is evident that the Roman Church cannot admit that there ever existed two popes; but the fact is, that in many cases both competitors for the papal chair (sometimes there were even three) were equally popes; that is to say, the position of all was equally strong. Each was frequently supported by whole nations, and the schism was nothing but the struggle of political interests, which induced particular governments to support a pope against the pope supported by other governments. Those were the most unhappy periods of the Roman Church, when to many other evils were added violent contests between rival candidates for the papal chair, and the consciences of the honest believers were offended and perplexed by the excommunications which the adversaries thundered against each other. These quarrels lessened much the belief in the pope's sanctity and infallibility, and shook the whole fabric of the church. The names and dates of the various antipopes are given in the list of popes in the article POPE.

ANTIPYRIN. See in SUPP.

ANTIQUARIES, men who employ themselves in the study or collection of antiquities. In England, Scotland, and most of the countries of Europe and America there are important associations of antiquaries. The object of these societies is the collection and preservation of ancient manuscripts, inscriptions, coins, sculptures, &c.; the examination of ancient edifices and other remains; in short, the investigation of everything likely to throw light on the manners, customs, and history of the past. The chief antiquarian society of Great Britain is the Society of Antiquaries of London, founded in 1572, revived in 1707, and incorporated in 1751. The president for the time being is an official trustee of the British Museum. It has published Archæologia (1770, &c.), Vetusta Monumenta (1747), and Proceedings from 1849. The Society of Antiquaries of Scotland was founded in 1780, and incorporated in 1783. The Archæological Institute of Great Britain and Ireland, established in 1843, is a society of similar character.

ANTIQUE, as a term of art, is usually applied to the remains of Greek and Roman art.

ANTIQUITY generally denotes the time previous to the irruption of the barbarians into the Roman Empire in the middle of the 5th century, or previous to our era. In a narrower sense it is applied to the period over which the ancient history of the two principal nations of former times, the Greeks and Romans, extends.—The name *antiquities* is commonly given to the remains of ancient art and industry, such as tools, weapons, sculptures, inscriptions, &c. It is also used in a wider sense to signify all which belongs to a knowledge of the politics, manners, religion, literature, and arts of the nations of antiquity, or of the modern nations, until the existing order of things commenced. See ARCHÆOLOGY.

ANTIRRHINUM, a genus of annual or perennial plants belonging to the natural order Scrophulariaceæ, and forming the type of a section of the order, having the upper lobes of the corolla outside the others in the bud. The genus is characterized by a five-parted oblique calyx; a personate corolla gibbous at the base but without a distinct spur, the lobes of the upper lip erect, those of the lower spreading, trifid, the middle segment smallest, and a bearded palate which closes the mouth; capsule two-celled; seeds oblong and minute. The common English name of the genus is the *snapdragon*, given to it because the blossoms, when pressed between the finger and thumb, may be made to open and shut like a mouth. Most of the species are natives of Europe, especially of Southern Europe. Some of them inhabit North America and the West Indies. They all produce showy flowers, and are much cultivated in gardens. Many varieties of some of them, such as the great or common snapdragon (*Antirrhinum majus*), have been produced by gardeners. The only species indigenous in Britain is *A. Orontium*, but *A. majus* is found wild. The name is from the Greek *antirrhinon*, from *anti*, indicating likeness, and *rhis* (*rhinos*), nose or snout.

ANTISCORBUTICS, remedies against scurvy. See SCURVY.

ANTI-SEMITES, the name given to those who on the Continent oppose the Jews on account of their great wealth and power, or for reasons (or prejudices) not easy to estimate. Anti-Semite principles have been responsible for an enormous amount of crime and oppression in very recent times.

ANTISEPTIC (from Greek, *anti*, against, and *sēpein*, to rot), a term applied to an agent or a process by which the putrefaction of vegetable or animal matters is prevented or arrested. The conditions which are necessary to the taking place of putrefaction are air, moisture, and a certain degree of heat, and whatever withdraws organic tissues from the putrefactive effect of these is an antiseptic. There are a great number of substances having this preservative property, among which are salt, alcohol, vegetable charcoal, creosote, corrosive sublimate, tannic acid, sulphurous acid, sulphuric ether, chloroform, arsenic, wood-spirit, aloes, camphor, benzine, aniline, &c. The packing of fish in ice, and the curing of herring and other fish with salt, are familiar antiseptic processes. The different antiseptics act in different ways. Alcohol, salt, and wood-spirit combine with the water of the substance to which they are applied, and also with the substance itself, which they render more durable. Creosote and tannic acid preserve substances by causing the coagulation of the albumen which they contain. Sulphurous acid combines with the oxygen, and deoxidizes substances. Vegetable charcoal acts rather as a disinfectant by absorbing the products of putrefaction. It is applied with other antiseptics in medicine. Timber is often preserved by means of antiseptics, such as sulphate of copper, chloride of zinc, and corrosive sublimate. Antiseptic treatment has been in recent times applied with great success in surgical cases, under the lead of Lord Lister, and hence has been called Listerism. See GERM THEORY, DISINFECTANT, PUTREFACTION, &c.

ANTISPASMODIC, a medicine proper for the cure of spasms and convulsions. Opium, balsam of Peru, and the essential oils of many vegetables, are the most useful of this class of medicines.

ANTISTHENES, a Greek philospher and disciple of Socrates, the founder of the school of Cynics, born at Athens B.C. 444, was the son of an Athenian and a Thracian woman. He fought at Tanagra B.C. 426, and was first a disciple of Gorgias and then of Socrates, at whose death he was present. He is also said to have aided in bringing some of his persecutors to justice. He survived the battle of Leuctra (B.C. 371), and is said to have compared the Thebans to schoolboys who had whipped their master. He taught at the Cynosarges, a gymnasium appropriated to Athenians who had foreign mothers. His

disciples were few, and he is said to have exhibited an unphilosophical temper on this account, and to have driven away those who attended him, but Diogenes remained with him to the end. Antisthenes affected a mean appearance. He was little esteemed by Plato or Aristotle, and Socrates is said to have told him he saw his vanity through the holes of his coat, and Cicero styles him more acute than learned. His works were numerous, and abounded in wit and satire. He attacked many of his contemporaries, as Alcibiades, Gorgias, and Plato. He combated Plato's Theory of Ideas, because, as Plato alleged, of his incapacity to appreciate it.

The philosophical system of Antisthenes was mainly ethical. Wisdom, according to him, consisted in perfect conformity to virtue, and he held pleasure (by which he appears to have meant especially sensual pleasure) to be a positive evil. He often expressed his views in extreme forms amounting to paradox; thus he is reported frequently to have said that madness was preferable to pleasure. Virtue he made to consist in reason developed into action by energy. It makes the wise man superior to error. In his physics he contended for the unity of the deity, and appears to have entertained the conception of divine providence as promotive of good and frustrative of evil. In logic he defined definition as the expression of the essence of the thing defined. The simple he held cannot be defined, but only named and compared. He considered self-contradiction impossible, because each thing has only one description, so that the affirmations really made of the same thing must be equivalent. If two affirmations are not equivalent they refer to different things. The school of Antisthenes, for want of a solid dogmatic basis, soon degenerated into extravagances, but it is important for the influence of its morality upon the Stoics, and it is through the school of Zeno that the true descent of the Cynic doctrine is to be traced. See ZENO OF CITIUM.

ANTITHESIS (opposition), a figure of speech by which two things are attempted to be made more striking by being set in opposition to each other. This figure often produces a great effect, yet, by too frequent use, becomes tiresome. Lessing affords an instance of a happy antithesis, when, in the review of a book, he says, 'This book contains much that is good, and much that is new; only it is a pity that the good is not new, and the new is not good.' The following is an example in poetical composition:—

> 'Though deep, yet clear; though gentle, yet not dull;
> Strong, without rage; without o'erflowing, full.'

ANTITOXIN, a substance that counteracts certain poisons. See in SUPP.

ANTITRINITARIANS, all who do not receive the doctrine of the divine Trinity, as it is represented by the Nicene and Athanasian creeds, and either put the Son and the Holy Spirit in the Godhead below the Father, or consider Christ merely a man, and the Holy Spirit an arbitrary personification of the divine mind. See UNITARIANS.

ANTIUM, one of the most ancient and powerful cities of Latium, the chief city of the Volsci, and often at war with Rome, from which it was 38 miles distant. It was situated on a promontory, and was a flourishing seaport. It was taken by the Romans in 468 B.C., and a colony was then sent to it, but it soon revolted, and maintained its independence till finally taken by Rome in 338 B.C. After this it appears as one of the maritime colonies of Rome. Towards the close of the republic and during the empire it was a favourite residence of the wealthy Romans, and both the town and its neighbourhood were adorned with temples and splendid villas. Nero and Caligula were born at Antium. It was entirely destroyed by the Saracens; but vestiges of it still remain at Porto d'Anzo, near which many works of art, including the Apollo Belvidere and the Fighting Gladiator, have been found.

ANT-LION, the larva of a Neuropterous insect (*Myrmeleon formicarius*), which in its perfect state greatly resembles a dragon-fly. The larva has attracted much more notice than the perfect insect on account of its ingenious method of catching the insects—chiefly ants—on the juices of which it feeds. The ant-lion has a large abdomen, and a small head furnished with a powerful pair of jaws or mandibles; and as it is slow of movement it has recourse to stratagem to obtain its prey. For this purpose it digs a funnel-shaped hole in the driest and finest sand it can find, working inside the hole and throwing up the particles of sand with its head. When the pit is deep enough, and the sides are quite smooth and sloping, the larva buries itself at the bottom with only its formidable mandibles projecting, and waits till some luckless insect stumbles over the edge. Once over, the insect has little chance of recovering itself. The sand yields beneath its feet, and it is carried with fatal certainty to the bottom. If the prey appears likely to escape the ant-lion brings it within reach of its jaws by throwing particles of sand upon it. The ant-lion gets rid of the dead bodies of its victims by placing them on its head and throwing them from its hole by a sudden and powerful jerk. Flies and large ants are sometimes thrown to the distance of 3 inches from the edge. (See plate at article ENTOMOLOGY.)

ANTOINETTE, MARIE (Marie Antoinette Joseph Jeanne de Lorraine), Archduchess of Austria and Queen of France, the youngest daughter of the Emperor Francis I. and of Maria Theresa, was born at Vienna, 2d November, 1755. Her education appears to have been somewhat narrow. Metastasio and Gluck are mentioned among her teachers, and after her betrothal she was put under the charge of the Abbé de Vermond, who retained his influence till 1789, when he was dismissed. The choice of Marie Antoinette by the Duc de Choiseul as the wife of the dauphin was unpopular in France, where Austria was then regarded with a keen jealousy, increased by the reputation of Maria Theresa. This national prejudice laid the foundation of a popular antipathy to Marie Antoinette, which was significantly conveyed in the epithet L'Autrichienne. On 16th May, 1770, Marie Antoinette, aged 14½ years, was married to the dauphin Louis, who on 23d August following completed his fourteenth year. Her progress through France was a continual fête, and splendid fêtes were prepared in her honour at Paris and Versailles. On 30th May these celebrations were attended by an accident to a scaffolding, by which many people were killed. The manners of Marie Antoinette were ill-suited to the French court, and she made many enemies among the highest families by her contempt for its ceremonies, which excited her ridicule. The freedom of her own manners, even after she became queen, was also a cause of scandal. Many of her indiscretions were indeed extreme, and the accusations of her enemies are still persistent. For instance, she went to the theatre in disguise, and when her carriage broke down she took a fiacre with a single female attendant; and she put forward the clock to make her husband anticipate his early bed-hour when she had planned a nocturnal excursion. In ordinary times such indiscretions might have been without significance, but the state of parties in France gave them a sinister importance. From the time of her arrival the court had been deeply tainted with the philosophical revolutionary sentiments which had spread so widely among the

people. A deliberate plan was formed by the revolutionary party to take advantage of the national sentiment to attack the monarchy from the side of the Austrian alliance. Magnified reports of every imprudence of the queen were, even in the time of her greatest popularity, spread by the persistent enmity of a faction which had already selected her as the victim of the monarchy. She appears at first to have enjoyed little of her husband's confidence; she selected her own society apart, and not very judiciously; so that on the disgrace of Choiseul the anti-Austrian party were not without some grounds, as it is alleged from Louis' papers, for anticipating a divorce. The accession of Louis XVI. (10th May, 1774) did not at first make much change in the position or conduct of the queen. She had two favourites, the Princess de Lamballe and the Duchess of Polignac, who shared in the scandals attributed to her, and afterwards in her unpopularity. About 1777 she began to acquire the confidence and love of the king, and to take an interest in public affairs, and the serious side of her character rapidly developed. In 1778 she gave birth to a daughter, in 1781 to the first dauphin (died 1789), in 1785 to the second dauphin, in 1786 to another daughter, who died the following year. Her interference in public affairs, almost necessitated by the king's weakness of character, produced violent jealousies. The dilapidation of the finances, which had reached a crisis before she arrived in France, was openly charged to her extravagance. It was in vain that she strove by private charity to remove the prejudices against her conduct. In the severe winter of 1778 the Parisians, in acknowledgment of her gifts, erected to her a monument of snow, and their memory of benefits was as cold and short-lived as their means of testifying it. In 1785 the reputation of the queen received a severe blow from the affair of the necklace. (See La Motte.) The acquittal of De Rohan, which seemed to reflect on her, caused her many bitter tears. The unfortunate ministries of Calonne and Loménie de Brienne were attributed to her, and she is said to have opposed with all her influence the assembly of the notables and the states-general. When the revolution had begun its course she became the centre of all reactionary influences. Her advice was followed so far as to prevent Louis from saving himself by implicit submission, but not far enough to give him any chance of saving himself by resolute resistance. On 5th and 6th October, 1789, after the celebrated supper to the guards, the mob assailed the palace with the express design of assassinating the queen. Her courage in showing herself alone at the window when called for saved her. The assembly having ordered the royal family to be brought to Paris, they were conducted thither by the mob amid frightful insults, the heads of two guards killed in their defence being carried on poles beside the royal carriage. Treated as prisoners at the Tuileries the royal family could not take cordially to the revolution, and the queen's relations with foreign courts and with the emigrants were the subject of just suspicion to her keepers. The king used his constitutional veto against the law of the civil constitution of the clergy. This earned the queen, to whom every resolute action was attributed, the soubriquet of Madame Veto. After the abortive flight of June 20–21, 1792, the details of which were organized by the queen, the royal family were kept under stricter surveillance. After swearing to the constitution of 14th September, 1791, the king was reinstated in his functions. Marie Antoinette appears, notwithstanding, to have kept up an incessant correspondence with the powers in hostility with France, and the rapid course of events and the constraint to which all her actions were subjected may form some apology for any duplicity with which her conduct may be charged. On 20th June the Tuileries were invaded by the mob, and the queen subjected to new insults. On 10th August, the last day of royalty, she strenuously resisted the resolution of the king to take refuge in the assembly. On 3d September her implacable enemies the mob penetrated to the garden of the Temple, to which the royal family had been conveyed, to show her the head of her favourite the Princess de Lamballe on a pole. The king and queen were now separated, and Louis was executed on 21st January, 1793. The dauphin, who afterwards perished miserably in confinement, was next separated from the queen, and on 2d August, 1793, Marie Antoinette was transferred to the Conciergerie to be brought before the Revolutionary Tribunal. The act of accusation was completed on 14th October. From the point of view of this tribunal Marie Antoinette had merited death, but some of the charges brought against her were ridiculous and some were infamous. She was condemned at 4 a.m. on 16th October, 1793, and at 11 a.m. was led from the Conciergerie to the place of execution. The procession was circuitous, passing through the most populous parts of the town and lasting several hours. She died with the firmness that became her character.

ANTOMMARCHI, Carlo Francesco, the last physician of Napoleon, was born in Corsica in 1780, and was professor of anatomy at Florence, when he offered himself to replace O'Meara as physician of Napoleon at St. Helena. Napoleon at first received him with reserve, but soon admitted him to his confidence, and testified his satisfaction with him by leaving him a legacy. On his return to Europe he published the Derniers Moments de Napoléon (two vols. 8vo, 1823). He also wrote the text for a folio series of anatomical plates published in 1823–26. In 1830 he published a bust which he had taken of the emperor. As it did not exhibit the phrenological developments anticipated by Gall, a controversy was raised as to its genuineness. In 1831 Antommarchi went to Holland to assist the insurgents; and in 1836 he went to New Orleans, where he practised homœopathy. He subsequently visited Havana and Cuba, where he died in 1838.

ANTONINUS, Itinerary of. See Itinerary.

ANTONINUS, Marcus Annius Verus Aurelius, the philosopher, best known by the name of Marcus Aurelius, born A.D. 121, ascended the throne A.D. 161, after the death of Antoninus Pius, who had adopted him. He voluntarily divided the empire with Lucius Verus, whom he made emperor and united in marriage with his daughter Lucilla. Brought up and instructed by Plutarch's nephew Sextus, the orator Herodes Atticus, and the famous jurist L. Volusius Mecianus, he had become acquainted with learned men, and formed a particular love for the Stoic philosophy. In the early part of his reign an inundation of the Tiber destroyed a part of Rome, and famine and earthquake also prevailed. The Parthian war also broke out. He endeavoured to mitigate the distress at home, while his generals, Statius Priscus, Avidius Cassius, Marcius Verus, and Fronto, overcame the Parthians, conquered Armenia, Babylon, and Media, and destroyed the great city Seleucia on the Tigris. At the same time he undertook to improve the morals of the people and the administration of justice. Lucius Verus had been sent out to the East to conduct the war, but he did not go farther than Antioch. Nevertheless, after the termination of the Parthian war he returned to Rome and celebrated a triumph (166). A fearful pestilence now broke out, with which the eastern army infected all the countries they passed through. In addition

to this there was a universal insurrection on the confines of the empire, from Gaul to the Black Sea, and much anxiety prevailed at Rome. Both emperors now thought it advisable to go in person in order to attack the Marcomanni and other rebellious tribes. A part of the enemy submitted for a time, but soon took up arms again. Verus died A.D. 169, after which the emperor carried on hostilities with the greatest vigour alone, though from the exhausted state of the treasury he saw himself reduced to the necessity of selling the most valuable furniture of the palace. In the following campaigns numerous engagements were fought, in which the Romans came off conquerors. The most famous of their victories was that over the Quadi in A.D. 174, which was believed to have been attended by supernatural circumstances, and gave rise to the discussion about the so-called miracle of the thundering legion. (See THUNDERING LEGION.) Dion Cassius tells us that the emperor's army was surrounded by the enemy, and reduced to great extremity for want of water, when a sudden shower fell and refreshed the Romans, while their adversaries, who had just attacked them, were assailed by a dreadful storm of hail and thunder, and were totally defeated. After this victory the Marcomanni, the Quadi, as well as the rest of the barbarians, sued for peace. The sedition of the Syrian governor, Avidius Cassius, who had brought Egypt and the region within Mount Taurus to own his authority, called off the emperor from his conquests; but before he reached Asia the rebel was slain by his own party. Aurelius pardoned all who were engaged in the revolt, marched in triumph to Rome, and busied himself about the internal concerns of the empire, till new incursions of the Marcomanni compelled him once more to take the field. He conquered the enemy several times, but was taken sick at Sirmium, and died at Vindobona (Vienna) in 180 A.D. The best editions of the Meditations, which he wrote in Greek, and in which he acknowledges himself a follower of the Stoics, are by Casaubon (London, 1643), Gataker (Cambridge, 1652, reprinted at London, 1697), and Koraes (Paris, 1816). They have been translated into English, French, German, &c. Aurelius was one of the best emperors who ever governed Rome, although his philosophy and the natural magnanimity of his character did not restrain him from the persecution of the Christians.

ANTONINUS, THE WALL OF, a barrier erected by the Romans across the isthmus between the Forth and the Clyde, in the reign of Antoninus Pius. (See next article.) Its western extremity was at or near Dunglass Castle on the latter river, its eastern at Caerridden or Carriden on the former, and the whole length of it exceeded 36 miles. It was constructed A.D. 140 by Lollius Urbicus, the imperial legate, and consisted, when entire, of a ditch 40 feet wide and 20 feet deep, and a rampart on the south side 24 feet thick and 20 feet in height, the rampart being formed of stone and of the earth that was thrown up. This barrier was strengthened at each end and along its course by a series of one-and-twenty forts. A military road ran along it on the south side connecting the different stations with each other. This wall is now nearly demolished by the ploughshare. General Roy, in his 35th plate, has traced its course, and given plans of the stations belonging to it. This was the third rampart built by the Romans against the incursions of the North Britons. It is called by the people in the neighbourhood *Graham's Dyke*.

ANTONINUS PIUS (Titus Aurelius Fulvus), of a family originally from Nemausus (now Nimes) in Gaul, was born at Lavinium, in the neighbourhood of Rome, A.D. 86. His father, Aurelius Fulvus, had enjoyed the consulship, and, A.D. 120, he succeeded to the same dignity. He was one of the four persons of consular rank among whom Hadrian divided the supreme administration of Italy. He then went as proconsul to Asia, and after his return to Rome became more and more the object of Hadrian's confidence. By his wife Faustina, the daughter of Annius Verus, whose licentious conduct he wisely endeavoured to conceal from the view of the world, he had four children. They all died but Faustina, who afterwards became the wife of Marcus Aurelius. A.D. 138 he was adopted by Hadrian, for which reason he in his turn adopted L. Verus and M. Annius Verus (Marcus Aurelius). The same year he ascended the throne, and under him the empire enjoyed tranquillity and happiness. Temperate and simple in his private life, ever ready to assist the necessitous, an admirer of virtue and wisdom, he was truly the father of his people. He often repeated those beautiful words of Scipio, 'I had rather preserve the life of a citizen than destroy a thousand enemies.' His wise frugality enabled him to diminish the taxes. The persecutions of the Christians he speedily abolished. He carried on but a few wars, namely, in Britain, where he extended the Roman dominion, and by raising a new wall put a stop to the desolating invasions of the Picts and Scots. The senate gave him the surname *Pius*, that is, remarkable for filial affection, because, to keep alive the memory of Hadrian, his second father, he had built a temple in honour of him. Conflagrations, floods, and earthquakes spread desolation in many places during his reign, but his generosity did much to mitigate the consequences of these unhappy events. He died A.D. 161. His remains were deposited in the tomb of Hadrian. His adopted sons built a pillar to his memory, the fragments of which were found at Rome in 1705. The so-called *Antonine Column*, still standing in the Piazza Colonna, was erected by the senate to Marcus Aurelius Antoninus (see above) in honour of his victories over the Marcomanni. The whole kingdom lamented him, and the following emperors assumed his name as an honour.

ANTONIUS, MARCUS, the triumvir, son of the prætor, and grandson of the orator of the same name, born 83 B.C., was connected with the family of Cæsar by his mother Julia, a lady of distinguished excellence. He was brought up by his step-father Cornelius Lentulus, who was put to death by Cicero in 63, as one of the conspirators with Cataline. To revenge his step-father Antony joined Clodius in his opposition to Cicero. Debauchery and prodigality, however, marked his youth. To escape his creditors he went to Greece in 58, and from thence followed the consul Gabinius on a campaign in Syria as commander of the cavalry. He showed much activity and courage here, as well as in the campaigns against Aristobulus in Palestine (57–56) and in Egypt (55), where he aided in the restoration of Ptolemy Auletes (55). The soldiers, whom he treated with extreme generosity, indulgence, and confidence, conceived a strong affection for him. In 54 he went to Gaul, and in the following year returned to Rome, where, through the influence of Cæsar and Cicero, with whom Cæsar had reconciled him, he was elected quæstor. In this capacity he returned to Gaul and served under Cæsar in 52 and 51. In 50 he returned to Rome to support the interests of Cæsar against the aristocratical party headed by Pompey. He was elected augur and tribune. With the other tribune, Q. Cassius, he interposed his veto to the law for depriving Cæsar of his command, which was passed in the senate on 1st January, 49; but their lives were threatened by the Pompeian party, and they took refuge with Cæsar in Gaul. Cæsar now marched into Italy, of which he

obtained immediate possession, and appointing Antony to the supreme command, crossed into Spain. In 48 he led reinforcements to Cæsar in Greece, and in the battle of Pharsalia he commanded the left wing. He afterwards returned to Rome with the appointment of master of the horse and governor of Italy (47). In this position he gave himself up to debauchery and licentiousness. In 46 he married Fulvia, the widow of Clodius (he had had several wives previously), who exercised great influence over him. A temporary difference occurred between him and Cæsar owing to his purchase of Pompey's property, the price of which he expected would be remitted, but which Cæsar insisted should be paid. In B.C. 44 he became Cæsar's colleague in the consulship, and endeavoured to prevail upon the people to acknowledge him as king. Soon after Cæsar was assassinated, and Antony, who had been sounded by the conspirators and found sincere in his attachment to the dictator, would have shared the same fate had not Brutus, who hoped to gain him over for the republic, stood up in his behalf. Antony now obtained possession of the property and papers of Cæsar; and by the reading of his will, and by the funeral oration which he delivered over his body, in the course of which he spread out the blood-stained robe of the dead, he excited the people to anger and revenge. The murderers were obliged to flee, and Antony was for a time the foremost man in Rome. After several quarrels and reconciliations with the young Octavianus, Cæsar's heir (see AUGUSTUS), who was aspiring to supreme power, Antony departed to Cisalpine Gaul, which province had been conferred upon him against the will of the senate. Here he laid siege to Mutina, which was boldly defended by Decimus Brutus, who claimed the government of the province in virtue of the promise of the late dictator. In the meantime Cicero thundered against him in his famous Philippics; the senate declared him a public enemy, and intrusted the conduct of the war against him to Octavianus and the consuls Hirtius and Pansa. At first Antony vanquished Pansa in a bloody battle, but Hirtius hastened to his aid, and Antony was defeated at Mutina, April, 43. Both consuls, however, fell, and Octavianus took the head of the republican army. Antony fled with his troops over the Alps amid great difficulties and privations. Here he was joined by Lepidus, who commanded in Gaul. Plancus also, and Pollio strengthened his party with their forces; so that Antony, who a short time before had fled from Italy, returned now at the head of twenty-three legions and 10,000 horse. Through the mediation of Lepidus, Antony and Octavianus were reconciled. It was agreed that the Roman world should be divided among the three conspirators, who were called triumvirs. Antony was to take Gaul; Lepidus, Spain; and Octavianus, Africa and Sicily. They decided upon the proscription of their mutual enemies, each giving up his friends to the others. Upon this the triumviri marched to Rome, and their steps were marked with murder and rapine throughout Italy. Antony caused Cicero's head and right hand to be fixed up as a spectacle on the rostra from which his eloquence had so often been victorious. According to Appian 300 senators and 2000 knights perished in this proscription. When the sum of money necessary for the war was procured, namely, 200,000,000 sesterces (above a million and a half sterling), and the triumviri had appointed magistrates for several years, Antony and Octavianus departed in 42 for Macedonia, where the united forces of their enemies, Brutus and Cassius, formed a powerful army. At Philippi Antony commanded in an engagement against Cassius, who, when he perceived the event of the fatal battle, ordered one of his slaves to stab him. After the second battle Brutus also destroyed himself. At the sight of his body Antony displayed the deepest emotion, covered it with his cloak, and gave orders that it should be interred with the highest honours. He then went to Greece, visited the public schools at Athens, and manifested his admiration of this city, splendid even in its ruins. Thence he proceeded to Asia. In Cilicia he ordered Cleopatra, queen of Egypt, to apologize for her insolent behaviour to the triumviri. She appeared in person, and her charms fettered him for ever. He followed her to Alexandria, where, in a constant course of dissipation, he bestowed not even a thought upon the affairs of the world, till he was aroused by a report that hostilities had commenced in Italy between his wife Fulvia and Octavianus. A short war followed, which was decided in favour of Octavianus before the arrival of Antony in Italy. The death of Fulvia facilitated a reconciliation between the two triumvirs, which was sealed by the marriage of Antony with Octavia, the sister of Octavianus. A new division of the Roman dominions was now made (in 40), by which Antony obtained the East, Octavianus the West. For mere form Africa was consigned to the feeble Lepidus. With Sextus Pompey, who ruled the Mediterranean, a treaty was made. Upon this Antony went to Athens, while his legate Ventidius carried on a successful war against the Parthians. A new quarrel which threatened to break out between him and Octavianus, and which brought him back to Italy (37), was averted by the interposition of Octavia. The triumvirate, which had expired, was renewed for five years. After his return to Asia Antony gave himself up to a most abandoned course of life; he sent back his wife Octavia, and gave himself up entirely to Cleopatra, upon whom he bestowed Cœle-Syria, Phœnicia, and other provinces. After a disgraceful campaign against the Parthians he took Artavasdes, king of Armenia, prisoner, by treachery, accusing him of want of fidelity, and carried him in triumph to Alexandria (34). He now assumed the style of an eastern despot, and by his un-Romanlike conduct and slavish devotion to Cleopatra alienated many of his adherents and embittered public feeling against him at Rome. All this chimed in excellently with the views of Octavianus, who wished nothing better than an opportunity of crushing his rival; and he took care to foment the discontent which Antony's proceedings caused. War between the two rivals became inevitable, and both began to prepare for it. Amid a round of pleasures Antony neglected his most important affairs, and filled the Island of Samos, the rendezvous of his troops, with musicians and revellers. At length war was declared at Rome against the Queen of Egypt, and Antony was deprived of his consulship and government. Each party assembled its forces, and Antony lost, in the naval battle at Actium (B.C. 31), the dominion of the world. He disgracefully followed Cleopatra in her flight. The army on land surrendered to the conqueror. On the arrival of Octavianus before Alexandria, Antony's fleet and cavalry deserted to the enemy, and his infantry was defeated. Deceived by a false report which Cleopatra had disseminated of her death, he fell upon his own sword (B.C. 30).

ANTONY, MARK. See ANTONIUS (MARCUS).

ANTONY, ST., the *Great*, one of the founders of monachism in the East, was born A.D. 251, at Coma, near Heraclea, a town of Upper Egypt. He went into retirement from a propensity to devotion, A.D. 285, when he had never known the pleasures of knowledge, and probably never learned to read. In A.D. 305 several hermits united with him, and formed the first community of monks. He went to Alexandria (in A.D. 311) during the Maximinian persecutions to seek

the honour of martyrdom, but as his life was spared he returned to the cottages of his monks. He afterwards left this institution to the care of his scholar Pachomius (see MONASTERY), and retired with two friends to a more remote desert, where he died A.D. 356. The 17th January is regarded as the day of his death. His only garments are said to have been a shirt made of hair and a sheep-skin, and bread and water formed his regular diet. Strange stories are told of the temptations and trials from fiends to which he was subjected in his lonely life, and certain of these are related in his life by St. Athanasius. All his conduct indicates a fervent and melancholy imagination. Seven letters and some ascetic writings were formerly attributed to him, but it is not probable that he was their author. Although he founded monachism, he laid down no rules and founded no order, the rules ascribed to him by the heretical sects of the East having been drawn up by St. Basil. As a saint of the Catholic Church, Antony is much esteemed. Prayer for his intercession was intended, particularly, to preserve from the St. Antony's fire, so called from him—a violent and terrible disease of the middle ages, which is said to have dried up and blackened every limb which it attacked, as if it were burned. Gaston, a rich nobleman in Dauphiné, whose son had been cured (as he believed) by the relics of St. Antony at St. Didier-la-Mothe, in token of his gratitude established, A.D. 1095, the fraternity of St. Antony, for the care of the sick and the assistance of pilgrims, of which he was the first chief. This order received, in the ecclesiastical assembly at Clermont, A.D. 1096, the papal confirmation; took the monastic vows, A.D. 1218; and was declared by Boniface VII., A.D. 1298, a fraternity of regular canons, according to the rules of St. Augustine; their chief was to be termed *abbot*, have his seat at St. Didier-la-Mothe, and be the general of all the houses of that order. The dress of these Antonians was black, marked on the breast with a blue cross, nearly in the form of a T. They afterwards altered the rules of their institution, and devoted themselves to a silent contemplative life of devotion. The French revolution put an end to the order. St. Antony figures very frequently in sacred art in connection with his temptations, or with other incidents of his life; and in the middle ages almost every monastery desired to have a representation of the founder of monachism.

ANTONY OF PADUA, ST., born August 15, A.D. 1195, of a noble family in Lisbon, was one of the most renowned disciples of St. Francis of Assisi, and a powerful advocate of the Franciscan order, which he entered in 1220. He was shipwrecked on the coast of Italy in a voyage to Africa, which he had undertaken with a view of becoming a martyr to the Christian faith, and preached with great applause at Montpellier, Toulouse, Bologna, and Padua, where he died, June 13, A.D. 1231. Many wonderful incidents in his life are recorded by the hagiographers. All agree in extolling his talents as a preacher, and according to tradition the very fishes were affected by his eloquence. The church, particularly in Spain, Portugal, and Italy, honoured him as one of its most eminent saints; and great artists delighted to depict the wonders of which he was the hero. He was canonized by Pope Gregory IX. in 1232. At Padua a church containing his sepulchre is consecrated to him, which is a master-piece of architecture.

ANTRIM, a county of Ireland, province of Ulster, bounded on the north by the Atlantic Ocean, on the east by the north channel of the Irish Sea, on the south-east by Belfast Lough, on the south by county Down and Lough Neagh, and on the west by Lough Neagh and Londonderry; area, 762,080 acres, of which, in 1894, 68,402 acres were under oats; 40,269 acres under potatoes; 11,505 under turnips; and 98,497 in meadow and clover. The surface of the county is almost wholly composed of trap. The eastern and northern districts are comparatively mountainous, presenting basalt or limestone rocks, and tracts of heath and bog, but no part of it rises to a great height. Knocklayd and Trostan in the north-east; Slemish, near the middle of the county; and Divis, near Belfast, are the principal mountains. Besides the Lagan and the Bann, which flow from Lough Neagh, and separate Antrim from Down and Londonderry respectively, there are several smaller rivers, the chief of which are, the Main, flowing south into Lough Neagh; the Bush, flowing north into the Atlantic; the Six-Mile Water and the Crumlin, streams of less importance, entering Lough Neagh, &c. The general soil of the plains and valleys is strong loam, interspersed with patches of gravel and sand. Flax, now extensively cultivated, potatoes, oats, and barley are the principal agricultural produce. In the north the cattle are small, but in the lower districts better breeds are reared; the mountainous pastures feed numerous herds of goats and sheep; and the rearing of swine is extensive and profitable. Large quantities of the *pollan* fish, common in Lough Neagh, are exported for the London market; salmon fisheries are also successfully prosecuted. There are salt-mines at Duncrue, near Carrickfergus. Large beds of iron-ore have been recently discovered in the hilly district on the east between Larne and Cushendall; the ore is shipped to Cumberland, Wales, and the Clyde. Coals are wrought at Ballycastle on the northern coast; the shores of Lough Neagh furnish masses of petrified wood; and pearl-stone, rare in the British Islands, is found at Sandybrae, 20 miles from Belfast. The most striking objects for the tourist and the geologist are the magnificent colonnades exhibited by the range of basaltic strata that stretches almost the whole length of the northern coast, of which the celebrated Giant's Causeway is the most remarkable portion. The interior contains some scenes of picturesque beauty, particularly the fertile valley of the Lagan, between Belfast and Lisburn. The spinning of linen yarn, and the weaving of the yarn into linen fabrics, are the staple industries of the county. The principal towns are Belfast, Carrickfergus, Ballymena, Antrim, Lisburn, and Larne. Many of the inhabitants are descendants of Scottish immigrants of the seventeenth century. The county returns four members to Parliament. Pop. in 1881, 421,893; in 1901, 544,795.

The town of Antrim, situated at the north end of Lough Neagh, on the Six-Mile Water, is not a place of much consequence, though bleaching and malting and the linen and paper manufacture are carried on here. There is a very perfect round tower within a mile. Pop. (1891), 1385; (1901), 1826.

ANT-THRUSH (*Pitta*), a genus of Insessorial Birds, belonging to the section Dentirostres, and to the sub-family Formicarinæ of the Turdidæ or Thrush Family. The Giant Breve or Great Ant-thrush (*Pitta gigas*) inhabits Sumatra. It attains a length of 9 inches. The body is coloured of a light blue, the quills of the wings being black, tipped with light blue, the head and neck black, and the under parts brownish-gray. The head of this bird is of clumsy conformation, and appears relatively large when compared with the body. The legs are long and the body short, and altogether the bird possesses a sufficiently curious conformation, and one calculated to attract attention. The Short-tailed Ant-thrush (*Pitta Bengalensis*) is common in Bengal, and is coloured of a soft brown hue, marked on the top of the head with three longitudinal bands. The wing-

quills are black, and the throat a light brown, whilst the shoulders and tail possess a number of conspicuous green feathers.

ANTUNG, a rising Chinese seaport in Manchuria, at the mouth of the Yalu river, with railway connection into the interior. Its export and import trade in 1909 was over £8,000,000. Pop. 21,000.

ANTWERP (German, *Antwerpen*; French, *Anvers*), the chief port of Belgium, and the capital of a province of the same name, is a large city on the right bank of the Scheldt, 27¾ miles north from Brussels (by rail), and about 50 miles from the open sea. It lies in a fertile plain at an abrupt turn of the river, which is here over 200 yards wide. It is strongly fortified, being completely surrounded on the land side by a semicircular line of fortifications (including a broad and deep moat), with both its extremities resting on the river. This line was constructed after the middle of last century, the old line, which had become too narrow for the growth of the city, having been demolished and its site converted into fine boulevards, promenades &c. The defences of the city were completed by a line of forts and outworks outside, and at some distance from the fortified enceinte, and since then a second line of forts and batteries has been provided, in view of the increased power and range of modern artillery. The general appearance of the city is exceedingly picturesque an effect produced by the numerous churches, convents, and magnificent public buildings, the stately-looking antique houses which line its older thoroughfares, and the profusion of beautiful trees with which it is adorned. The older streets are, in general, exceedingly tortuous and irregular; but the streets of the newer quarters are broad and regular. There are several squares, some of which are very handsome, and a fine park with an ornamental sheet of water. At the head of the public buildings stands the cathedral, with a spire 400 feet high, one of the largest and most beautiful specimens of Gothic architecture in Belgium, said to have been commenced in the thirteenth century. It contains Rubens's celebrated masterpiece the Descent from the Cross. The other churches of note are, St. James's, which surpasses even the cathedral in its internal decorations, St. Andrew's, and St. Paul's, all enriched with paintings by Rubens, Vandyck, Teniers, and other masters. Among the other edifices of note are the exchange the town-hall, the palace, the gallery of painting and sculpture, the theatres, &c. There are an academy of the fine arts, a public library, botanical and zoological gardens, numerous learned societies and institutions, hospitals, asylums, &c. Antwerp is now a great European centre of trade (especially with Britain), largely of goods in transit. The harbour accommodation is continuously increasing, and includes docks with a water area of over 230 acres, river and other quays 15 miles long. Vessels aggregating 11,181,226 tons entered in 1908, half the tonnage being British. The imports include hides, coffee, sugar, tobacco, grain, wool, timber, dyestuffs, cottons, and other manufactured goods; the exports, hides, cottons and linens, sugar, and various kinds of manufactured goods. The industrial establishments consist of sugar refineries, cigar manufactories distilleries, shipbuilding yards, ropeworks, sailworks, petroleum refineries, stearine candle-works, soap-works, carpet-works, &c.

Antwerp is mentioned as early as the eighth century, and in the eleventh and twelfth it had attained a high degree of prosperity, which it long continued to enjoy. In the fifteenth and sixteenth centuries it had already a very extensive foreign trade, and its inhabitants numbered 200,000. The wars between the Netherlands and Spain greatly injured its commerce, which was almost ruined by the closing of the navigation of the Scheldt in accordance with the peace of Westphalia (1648). It was only in the last century that its prosperity has revived. In 1832 the citadel which the Dutch persisted in holding was taken by the French after a siege of several weeks. Pop. in 1910, 317,171. The province of Antwerp is separated from East Flanders on the west by the Scheldt, and is bounded on the north, east, and south by Holland, Limburg, and Brabant respectively. It consists of a fertile plain, 1100 square miles in area, and in 1910 had a population of 937,455.

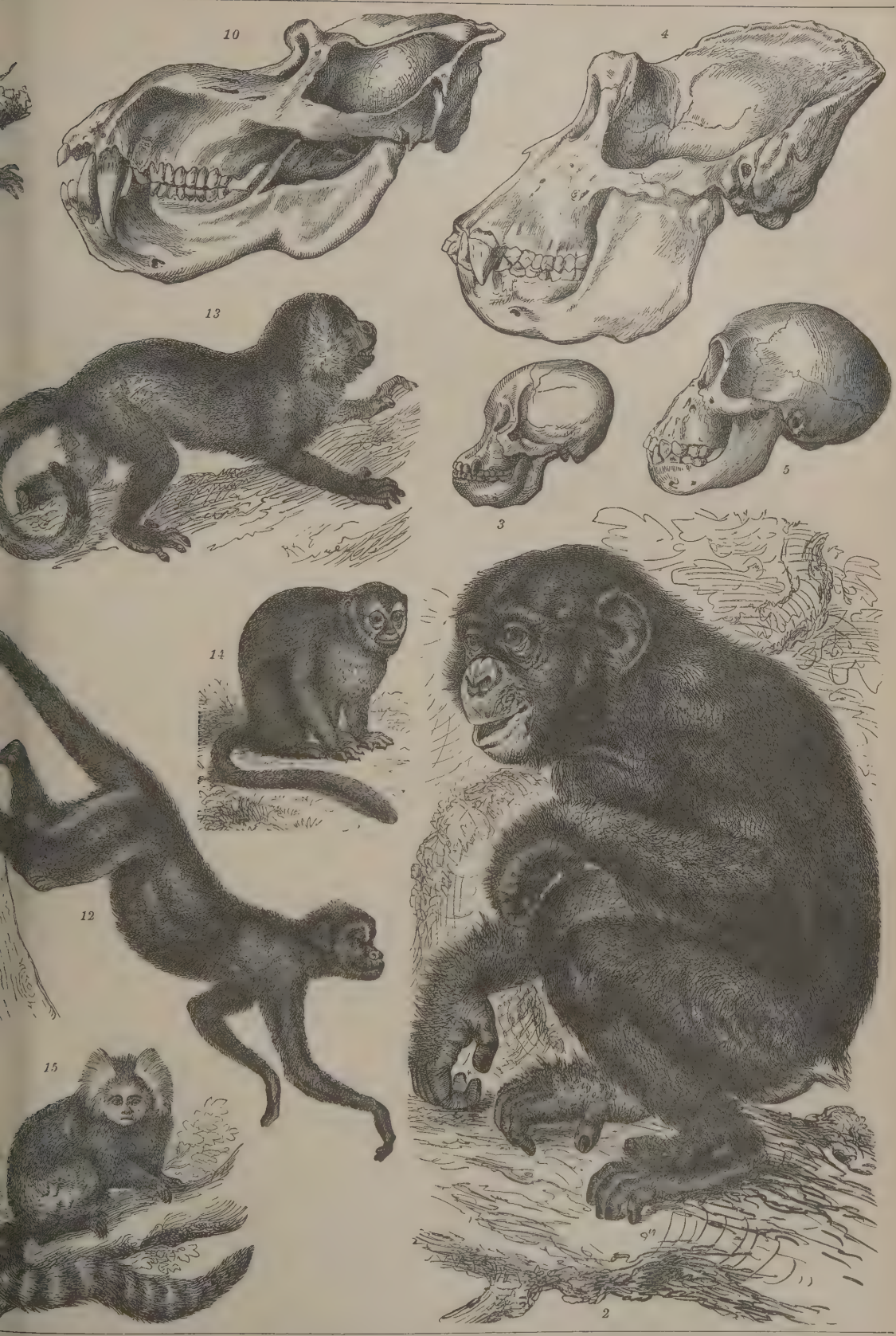
ANUBIS (*Anepo* on the monuments), one of the deities of the ancient Egyptians. He was the son of Osiris by Isis, though the Greek writers call Nephthys his mother. The Egyptian sculptures represent him with the head or under the form, of a jackal, with long pointed ears; and the notion, prevalent among the Greeks and Romans, that he had the head of a dog, is declared by Wilkinson to be an error. His office, like that of the Greek Hermes (Mercury) Psychopompos, was to conduct the souls of the dead from this world to the next; he presided over tombs, and he is frequently represented standing over a bier on which lies a corpse. In the lower world he weighed the actions of the deceased previous to their admission to the presence of Osiris, a duty in which he was assisted by Horus. The Greeks recognized in him their Hermes.

ANURADHAPURA, or ANARAJAPOORA, a ruined city the ancient capital of the Island of Ceylon, about lat. 8° 20′ N.; lon. 79° 37′ E. It was built about B.C. 540, and is said to have covered an area of nearly 300 square miles, but this is probably a great exaggeration. Its magnificence equalled its extent, and its main streets, as spacious as the widest in London, seem to have been lined by elegant structures. There are still several dagobas (see DAGOBA) in tolerable preservation here, forming huge mounds of masonry, certain other remains, and above all those of the sacred bo-tree, planted in 288 B.C., and probably the oldest historical tree in the world, but shattered by a storm in 1887.

ANVIL, in smithery and other manufactures of the malleable metals, is an instrument on which pieces of metal are laid for the purpose of being hammered. The common smith's anvil is generally made of seven pieces, namely, the core or body; the four corners for the purpose of enlarging its base; the projecting end, which contains a square hole for the reception of a set or chisel to cut off pieces of iron; and the seventh piece is the beak or conical end, used for turning pieces of iron into a circular form, welding hoops, &c. These pieces are each separately welded to the core, and hammered so as to form a regular surface with the whole. When the anvil has received its due form, it is faced with steel, and is then hardened by heating it and quenching it in cold water. The smith's anvil is generally placed loose upon a wooden block, the root-end of an oak-tree being preferred. The anvils used in cutlery and for files are fastened into a large block of stone, which is doubtless better than having the anvil loose upon a small block. The more firmly the anvil is connected with the earth and the substance it stands upon the greater will be the effect of the blow of the hammer.

ANVILLE JEAN BAPTISTE BORGUIGNON D', a celebrated French geographer, born at Paris in 1697. He early turned his attention towards geography, especially ancient geography. At the age of twenty-two he received the office of geographer to the king, with which was afterwards combined that of private secretary to the Duke of Orleans. He published 211 maps and plans, and seventy-eight treatises,

Fig. 1 Skeleton of young Orang-outang. 2 Chimpanzee. 3 Skull of young Chimpanzee. 4 Skull of old Gorilla. 5 Sk
11 Black Howler. 12 Coaita. 13 C



Gorilla. 6 Kahau or Proboscis Monkey. 7 Mona Monkey. 8 Magot or Barbary Ape. 9 Mandrill. 10 Head of Baboon.
7. 14 Night Monkey. 15 Marmoset.

His map of ancient Egypt is the best of his maps. His Orbis Veteribus notus and his Orbis Romanus are of great value to the student of ancient history. So, also, are his maps of Gaul, Italy, and Greece. His maps of the same countries for the middle ages are of equal value. His maps of modern times are as good as could be constructed from the materials available in his time. He died in 1782. His valuable collection of maps was purchased by the government in 1779.

ANZIN, a town of France, in the department of Nord, about 1 mile north-west of Valenciennes, in the centre of the most valuable coal-mines of France. The coal-field of the surrounding district is a very extensive tract and gives employment to about 15,000 persons. Some of the pits at Anzin are 150 fathoms deep. The seams are very numerous. The coal is of a rich caking quality, in general tolerably free from sulphur, well adapted for the smithy. The ample supply of fuel has led to the establishment of numerous industrial works at Anzin—blast-furnaces, forges, rolling-mills, foundries, nail-works, glass-works, breweries, distilleries, salt-refineries, soap and rope works. A good deal of chicory, also, is prepared. Pop. (1906), 14,169.

AORIST (Greek, *aoristos*, indefinite), the name given to one of the tenses of the Greek verb, which expresses indefinite past time. The Greek verb is very rich in past tenses, possessing besides the aorist also the imperfect, perfect, and pluperfect. While these express repetition, continuance, or the relation between one time and another, no such shade of meaning attaches to the aorist. The difference between the first and the second aorist is only in form and not in meaning.

AORTA, the great artery of the body, which springs from the left ventricle of the heart of man and mammals and birds, and which thus serves as the main channel through which pure blood passes outwards to supply the tissues. The vessel, after a short ascent, turns or arches backwards to the left side over the root of the left lung, and then becomes the *descending aorta*. It thus passes downwards through the thorax or chest on the left side of the spine, and terminates within the abdominal cavity, opposite the fourth lumbar vertebra, at which point it divides into the right and left common iliac arteries. From the *arch* of the aorta, the right and left coronary arteries (supplying blood to the heart itself), the innominate artery, left carotid and left subclavian arteries, arise. The vessels of the chest (pericardiac, bronchial, œsophageal, intercostal, &c.) arise from the portion of the descending aorta contained within the chest, whilst the arteries supplying the abdomen and its contained viscera arise from the abdominal aorta. In Birds the aortic arch turns to the *right* side, and in Reptiles *two* aortic arches (*right* and *left*) are developed.

AOSTA, a town of Italy, in Piedmont, 50 miles N.N.W. of Turin, on the left bank of the Dora-Baltea, in the middle of the Val d'Aosta. It is the seat of a bishop, and possesses a collegiate and three parish churches, two colleges, and two hospitals. Amongst its antiquities are a triumphal arch, erected to the memory of Augustus, who rebuilt the town and gave it the name of Augusta Prætoria; a gate with three arches, and the remains of an amphitheatre, and the old Roman walls which still surround the town. It has some trade in wine, cheese, hemp, and leather. Pop. 7830.

APACHES, a warlike race of American Indians at one time inhabiting the vast region lying between the Rio Colorado and the Rio Grande del Norte, in the United States, and extending also into the Mexican states of Chihuahua and Sonora. They adapted themselves to a life on horseback, and supported themselves by the chase and plunder, resisting all higher culture and civilization. When the Spaniards, in the sixteenth century, settled in the territory of the Apaches for the purpose of founding missions or opening mines, they found the natives proud and fond of freedom, but inoffensive and sociable. The oppressions of the Spaniards, however, led them to commence hostilities against them, and a certain number still maintain their independence and hostility to the whites; though about 6500 in the United States have been settled on reservations, more especially in Arizona and New Mexico.

APANAGE, an allowance which the younger princes of a reigning house (in which the right of primogeniture prevails) receive from the revenues of the country, that they may be enabled to live in a manner becoming their rank. It consists mostly in money, with the use of a residence and hunting grounds, attended frequently with the right of jurisdiction over these domains. When it is once fixed it passes to the descendants of the apanaged princes, sprung from a lawful marriage, of a suitable rank, and in their default commonly falls into the hands of the reigning sovereign. Apanage is not an English legal term, but is used on the Continent and is sometimes met with in Scotch history.

APATITE, a translucent but seldom transparent mineral, which crystallizes in a regular six-sided prism, usually terminated by a truncated six-sided pyramid. It passes through various shades of colour from white to yellow, green, blue, and occasionally red, scratches fluor but is scratched by feldspar, and has a specific gravity of about 3·5. It is a compound of phosphate of lime with fluoride and chloride of calcium. It occurs principally in primitive rocks and tin veins. In Spanish Estremadura it forms whole beds alternating with limestone and quartz. In some parts of Spain it is used as a building stone. Apatite in some of its forms is largely used as a fertilizer, serving the same purpose as bones or bone-ash manure, namely, to enrich the soil with phosphoric acid.

APE. (See the plate.) This designation, often indiscriminately applied to the members of the monkey tribe, was first properly restricted by Ray, the precursor of Linnæus, to those quadrumanous animals which most closely approximate to the human type of structure. In speaking of apes as distinguished from monkeys we have reference to those genera of the order Quadrumana which have neither tails nor cheek-pouches, attain nearly to human height, and present a facial angle varying from 65° to 30°. The term 'ape' as thus limited, applies to the *Anthropoid* or Man-like Monkeys, which belong to the section Catarhina ('oblique-nosed'), and which inhabit the Old World exclusively. Three genera are included in this Anthropoid section. Of these the Gibbons (*Hylobates*) of the Eastern Archipelago, represented by the Siamang (*H. syndactylus*) and by the Common Gibbon (*H. lar*), are distinguished by the great relative length of the fore-limbs. No tail exists, but hard patches or *natal callosities* are developed on the buttocks. The second genus is that represented by the Orang-utan of Sumatra and Borneo (*Simia Satyrus*), which possesses neither cheek-pouches nor natal callosities, the hips being covered with hair. No tail exists, and the hind-limbs are relatively short. The third genus includes the famous Gorilla (*Troglodytes Gorilla*) and the Chimpanzee (*T. niger*) of Western and Central Africa. The arms in the latter are shorter than in the Orangs and Gibbons, and the ears are large. The Gorilla, usually esteemed the most man-like of apes on the whole, has short hind-limbs, long arms, and a body which attains a height of 5 feet. The Gorilla is polygamous—that is, one

male mates with several females. Like most other Quadrumana the apes are destined to live among the branches of trees, and are especially adapted, from their size and strength, to occupy large forests. All of them have the power of assuming a nearly erect position, though on the ground this is by no means convenient, as they stand upon the outer edges of their feet, being unable to apply the palms fairly against the soil; and they require a staff or other support to maintain this attitude except when they have been taught to stand erect by man. They generally live in troops, and some of the species, such as the Chimpanzee and Orang, construct a habitation or hut of leaves as a defence against the weather. They defend themselves with clubs, and employ these weapons with considerable effect even against the human race. They are frugivorous in a state of nature, but from the resemblance of their teeth to those of the human species it is very evident that their diet may be almost as various as that of man. The Gibbons, as already remarked, are very remarkable from the exceeding length of their superior extremities, the arm being so long that the hands hang near the ground when the animal is in the erect posture. This singular conformation serves to assist them in balancing themselves on the branches of the lofty trees on which they chiefly spend their lives. The Gorilla is the largest and most formidable of all the Apes. Its height varies from 5 to fully 6 feet. It is very broad-shouldered, with great muscular arms, and its strength and ferocity are such that it reigns king in the forests it inhabits. With its massive jaws, which are furnished with long fangs, it can crush an ordinary musket-barrel with the greatest ease. It inhabits the equatorial regions of Western Africa. The well-known Chimpanzee is also an inhabitant of Western Africa, and especially of the coasts of Congo and Angola. In the proportions of its members and form of the head it closely resembles the human kind. Many wonderful stories are told of the intelligence manifested by apes, but in point of fact they never exhibit the thorough sagacity shown by a good dog, nor are they capable of an equal degree of improvement. As they advance in life they become untractable, savage, and dangerous. In their native haunts these animals manifest differences sufficiently striking, in their habits and modes of life, to render them interesting objects of contemplation. Some of the species are remarkable for great activity; others are sluggish, indolent, and inert. The females manifest an ardent attachment to their offspring, and make vigorous efforts to save them from injury. All show various degrees of that restless mobility which indicates how much they are under the exclusive influence of sensation without appearing to form conclusions from their repeated experience. An ape in captivity on seeing his image in a mirror will look behind it to discover the animal reflected, and will as eagerly perform this action after the thousandth repetition as the first. See GIBBON, GORILLA, ORANG.

A-PEAK, or APEEK (French, *à pique*). A ship or an anchor is said to be a-peak when the cable is drawn so tight into the bow as to bring her directly over the anchor, so that the cable bears right down from the ship's stem.

APELDOORN, a thriving town of Holland, in the province of Guelderland, 17 miles north of Arnhem, on the Grift Canal. There are large paper manufactories, and morocco leather and copper-plate for brewery and distillery boilers and for sheathing ships are made to some extent. Pop. (1910), 35,618 Near the town is the favourite summer royal residence of Loo.

APELLES, the most famous of the ancient painters, was the son of Pythias, and was born in the fourth century B.C., probably at Colophon in Ionia, on the coast of Asia Minor. At Ephesus he received the rights of citizenship and therefore is called sometimes the *Ephesian*. Ephorus of Ephesus was his first teacher, but attracted by the renown of the Sicyonian school he went and studied at Sicyon, though already himself an artist of reputation. In the time of Philip Apelles went to Macedonia, and there, probably, the friendship and familiar intercourse between him and Alexander the Great were established which have given origin to so many anecdotes. But many of these may relate to a meeting with Alexander in Ephesus, where Apelles had gone after a short stay at Rhodes, Cos, and Alexandria. While staying at Rhodes, having visited the study of Protogenes during the absence of the latter, he drew with a pencil on a panel standing ready to be painted a fine coloured line, in which Protogenes, on his return, recognized the masterly stroke of Apelles and undertook to excel him. He accordingly drew a second and finer line upon or within the first. Apelles returned and drew a third still finer than either of the former, so that the Rhodian painter declared himself conquered. The panel containing the lines was afterwards brought to Rome, and ornamented the palace of the Cæsars till destroyed in a conflagration. Apelles particularly excelled in representations of Aphrodite (Venus), the Graces, and similar subjects. The most admired of his pictures was that of Venus rising from the sea and wringing the water from her dripping locks. (See ANADYOMENE.) His portrait of Alexander with a thunderbolt in his hand was no less celebrated. By a happy application of perspective and chiaroscuro, the hand with the lightning seemed to project from the picture. The talent and renown of Apelles were at their height about B.C. 330. Death seems to have surprised the artist in Cos, where an unfinished Venus was shown as his work, which nobody dared to complete. The time of his death is not certainly known, but as he was at Alexandria after the assumption of the regal title by Ptolemy he must have lived down to 306 B.C. Among the anecdotes told of Apelles is the one which gave rise to the Latin proverb, 'Ne sutor supra crepidam'—'Let the cobbler stick to his shoes.' It is said that having heard a cobbler point out an error in the drawing of a shoe in one of his pictures he forthwith corrected it, whereupon the cobbler took upon him to criticize the leg of the figure and received from the artist the famous reply. The greatest merit of Apelles was inimitable grace; his works were full of life, grace, and poetry, and his art, therefore, was justly called *ars Apellea*. Until the very close of his life Apelles assiduously cultivated his art, which gave rise to the Latin proverb, 'Nulla dies sine linea'—'Not a day without a line.'

APENNINES (Latin, *Mons Apenninus*, from the Celtic *pen*, a mountain peak), a prolongation of the Alps, forming the 'backbone of Italy.' Beginning at the valley of Savona, near the town of that name on the west shore of the Gulf of Genoa, the Apennines traverse the whole of the Italian peninsula from top to toe, and also cross over into Sicily, the Strait of Messina being regarded merely as a gap in the chain. The total length of the Apennines from their commencement to the Strait of Messina is nearly 800 miles, including the sinuosities. The average height of the mountains composing the range is about 4300 feet, and nowhere do they reach the limits of perpetual snow, though some summits exceed 9000 feet in height. Monte Corno, called also Gran Sasso d'Italia, or the Great Rock of Italy, which rises among the mountains of the Abruzzi, not far from the town of Aquila, is the loftiest of the

chain, rising to the height of 9541 feet. In the same region rise the shapeless mass of the Majella, with its castellated crown of rocks, and the conical Monte Velino (9131 and 8174 feet high respectively), both of which overlook the beautiful lake of Celano. Monte Gargano, the ancient *Garganus*, which juts out into the Adriatic from the *ankle* of Italy, is a mountainous mass upwards of 5000 feet high, and 35 miles long, completely separated from the main chain; and is remarkable as forming almost the only irregularity by which the eastern coast of the peninsula is diversified. From the central range a number of valleys advance transversely towards the seas on either side of the peninsula. On the south the valleys of the Tiber, Arno, Garigliano, and Volturno are the only ones of the chain of any great extent; and the rivers that flow through them are the largest that rise in the Apennines, and the only ones of importance in the peninsular portion of Italy. The Apennines are generally divided into the Northern, the Middle, and the Southern Apennines, together with the Tuscan, the Roman, and the Vesuvian Sub-Apennines. They consist almost entirely of limestone rocks, and are exceedingly rich in the finest marbles. On the south slopes volcanic masses are not uncommon. Mount Vesuvius, the only active volcano on the continent of Europe, is an instance, and the lakes of Nemi, Albano, and others lie in the craters of extinct volcanoes. The main range is crossed by numerous passes, among which may be mentioned the pass of Bocchetta, near Genoa (2549 feet high), that of Pietra-mala, on the road from Florence to Bologna (3293 feet), and the Col d'Avezzano, on the road from Avezzano to Aquila (4569 feet).

APENRADE (Danish, *Aabenraa*), a seaport of Prussia, in the district of Schleswig, on the Little Belt and in the Bay (fiord) of Apenrade. It is beautifully situated in a deep valley, surrounded by woody heights and a fertile country. Its streets are crooked. Apenrade has a school of navigation and carries on a considerable seafaring trade. It employs a good many hands in fishing, and is resorted to for bathing. It received the rank of a city in 1284. Pop. (1900), 5952.

APERIENTS, mild purgatives. See PURGATIVES.

APHASIA (Greek, *a*, not, and *phasis*, speaking), in medicine, a term applied to indicate a symptom of a diseased condition of the brain, the patient being more or less unable to produce articulate sounds, although his intellect may not be manifestly disturbed. It has been long remarked by medical authorities that many persons who have suffered from apoplexy have lost either the complete control of their vocal organs, or the power of calling up words to express their thoughts. This interesting observation led to no thoroughly scientific inquiry until recently, when a number of physicians, mostly French, devoted considerable attention to this phase of disease. Aphasia does not result from any organic disease or defect in the vocal organs, but originates according to Dr. Gairdner from some form of disturbance of the cerebral functions. It may have been epilepsy or apoplexy, in which latter case there is often paralysis, almost invariably on the right side of the body. This paralysis may be of any extent of completeness, but in many cases the patient has such command over the movements of the tongue and lips as to show that it is not from paralysis his speech is affected. The states of intellect and consciousness are equally variable, the patient occasionally appearing and behaving as if he were in perfect bodily and mental health, except for the aphasia. Moreover, the aphasia shows itself in the most varied forms. In slight cases it is simply a more or less exaggerated form of the common defect of forgetfulness of, or inability to recall at will, the name of a person or thing. One of the patients who came under Dr. Gairdner's notice could carry on an ordinary conversation without much hesitation, but could not name the days of the week, nor remember or give utterance to his own name. In more aggravated cases the patient's vocabulary is reduced to two or three words in common use, and, oddly enough, cases have been known where the patients forgot all ordinary forms of speech, but could swear without hesitation. Aphasia is of two kinds. The disease may run its course in a few hours or days, but in most cases it lasts for months, and in many it becomes persistent. (See Dr. Gairdner's essay On the Functions of Articulate Speech (Glasgow, 1866); Dr. Bateman, on Aphasia; papers by Drs. Fraser and Tuke in the Journal of Mental Science for 1870; Dr. Ross on Aphasia, 1887.)

APHELION (Greek, *apo*, from, and *hēlios*, the sun), that part of the orbit of the earth, or any other planet, in which it is at the point remotest from the sun.

APHIS. See PLANT-LICE and CORN APHIDES.

APHONIA (Greek *a*, not, and *phōnē*, voice), in medicine, the greater or less impairment or the complete loss of the power of emitting vocal sound. The impairment or loss may be permanent or temporary, and instances are known in which the affection has taken on singularly intermittent forms. In one case the patient was regularly affected during the same season of the year for seventeen years, the aphonia beginning daily at noon and lasting through the rest of the day; and in another case, the patient, a young woman, could only speak for two or three hours daily during a period of fourteen years. The slightest and less permanent forms often arise from functional disorder, especially from extreme nervousness, fright, and hysteria, and occur chiefly in delicate, nervous, or hysterical females, and, though much more rarely, in males of a similar constitution. Slight forms of structural aphonia are of a catarrhal nature, resulting from more or less congestion and tumefaction of the mucous and submucous tissues of the larynx and adjoining parts. Severer cases are frequently occasioned by serous infiltration into the submucous tissue, with or without inflammation of the mucous membrane of the larynx and of its vicinity. This infiltration may be slight, and continue only during the catarrhal attack, or it may be of so aggravated a form as to nearly suppress the voice altogether and cause suffocation, as observed in œdema of the glottis and epiglottis. The voice may also be affected in different degrees by inflammatory affections of the fauces and tonsils; by tumours in these situations, by morbid growths pressing on, or implicating the larynx or trachea; by aneurisms; and most frequently by chronic laryngitis and its consequences, especially thickening, ulceration, &c. Aphonia from paralysis or hysteria must fall under the general treatment of these diseases. In cases where structural aphonia is amenable to treatment, antimonial ointment, or croton-oil rubbed on the fore part of the neck, the internal application of nitrate of silver, or a gargle composed of one drachm of tincture of perchloride of iron in half a pint of water have been found useful.

APHORISM a brief, sententious, or proverbial saying, in which a comprehensive meaning is involved, as 'Familiarity breeds contempt'; 'Necessity has no law'. Whole books have sometimes been formed of aphorisms, and the aphoristic style has been adopted by several of our writers.

APHRODITE, the goddess of love among the Greeks; synonymous with *Aphrogeneia*, that is 'born of the foam of the sea'. A festival called Aphrodisia

was celebrated to her in various parts of Greece, but especially in Cyprus. See VENUS.

APIARY AND APICULTURE. In the article BEE we give a short sketch of the natural history of the honey or hive bee (*Apis mellifica*); here we intend to treat briefly of the management of bees, the best forms of hives, the position and arrangement of the apiary, &c. One of the first things which demand the consideration of the bee-keeper is the situation of the apiary. It should be well sheltered from strong winds, either naturally or by the erection of walls or fences; as, if not sufficiently protected, the bees will not readily leave the hive, or when returning heavily laden with pollen and honey they are blown to the ground, or dashed against trees, buildings, &c., and thus many are lost. It should also afford the bees shelter against moisture, sudden changes of temperature, and the extremes of heat and cold. It should not be situated near large sheets of water, lest the bees, overcome by cold or fatigue, should be forced to alight on them, or be carried down on them by the winds, and so perish. The hives should face the south or south-east. They should be placed in a straight line, on shelves 2 feet above the ground, and about the same distance from each other; some skilful apiarians, however, raise the platform of the hive only 2 or 3 inches from the ground, as fewer of the chilled or tired bees that miss the hive in returning and alight near it are lost, the flight of the issuing swarms is lower, and there is less exposure to strong winds. The apiary should be so situated that it could be conveniently watched during swarming time; and should be at some distance from roads where there is much traffic, and from the grazing places of cattle, so as to prevent all possible means of disturbance and annoyance to its inhabitants. If grass surrounds the hives it should be frequently mowed, and the ground kept clean, to prevent too much dampness, and to destroy the lurking-places of noxious insects and vermin. As to the form of the hives, and the materials of which they should be constructed, there are great differences of opinion among apiarians. The old dome-shaped straw skep is still in general use among the cottagers of Great Britain, although almost entirely abandoned by those who practise bee-keeping systematically. Its cheapness and simplicity of construction are in its favour, while it is excellent for warmth and ventilation; but it has the disadvantage that its interior is closed to inspection, and the fixity of its combs prevents many manipulations which the skilful bee-keeper sees necessary to perform. To remedy this latter defect these hives have been fitted with movable bars from which the bees build their combs, which still, however, adhere to the sides of the hive, and have to be cut away, much to the annoyance of the inmates. The bar-frame hive, invented by Dzierzon in Germany or Langstroth in America, and subsequently modified by Baron Berlepsch in Germany and Messrs. Woodbury and Cheshire in Great Britain, is considered by many of our most experienced apiarians to be the most perfect form yet introduced. Mr. Woodbury's hive consists of a square wooden box, 14½ inches wide (inside measurement) and 9 inches deep, covered by a crown-board, which may be left loose or lightly screwed down. This cover has a circular hole in the centre about 2½ inches in diameter, through which food may be introduced to the bees, and which is closed by a piece of perforated zinc or plug of wood when not in use. The floor-board is 18 inches square, with an entrance cut in it forming a channel about 4 inches wide by ⅜ inch deep. At the part where the front of the hive crosses it slopes upward inside the hive. The alighting-board, fixed to this flooring, projects 3 or 4 inches in front of the entrance, and a wooden ridge roof covers all. The interior is furnished with ten frames, made of strips of light lath about ⅞ inch wide. The top bars are 15½ inches long, and project into notches cut into rabbets at the back and front of the hive. The rabbets are ⅜ inch deep, and the notches in them are of the same depth, so that the projections of the bars rest flush in them, leaving a space of ⅜ inch clear between the frames and the roof for the bees to move in. The ten frames occupy an equal portion of the interior space, being thus about 1½ inch apart. To induce the bees to build their combs straight in these frames a thin strip of comb is usually attached to the underside of the top bar, and the bees will follow the guide thus given. These frames, with the combs and bees in them, can at any time be lifted out one by one, whether for examination or for division of the stock for an artificial swarm. For the purpose of affording storage room for honey an upper story, called a *super*, is placed on the hive; it is of the same area in surface, but only from 3 to 5 inches in height; when filled, the super is taken off, and another substituted. When the super is added the crown-board of the hive is replaced by a thin board, called an *adapter*; on each side of this board is a long slit $\frac{3}{16}$ inch wide, which allows the working bees to pass, but not the queen and drones, as it is not desirable that the former should deposit her eggs there, and the drones would simply consume more or less of the stock of honey. Elegant supers, adapted for this form of hive, and also for the ordinary straw skep, are made of glass globes; this enables the inquirer to study the economy of the bee without the risk of being stung. In the management of bees a good deal depends on supplying them with abundant nourishment. It is impossible to say with any certainty how far bees may roam in quest of food; some authorities consider a mile the probable distance. However this may be, it is of great importance that the apiary should be situated in the neighbourhood of good feeding grounds, such as gardens, clover-fields, or heath-covered hills, cornfields being for the greater part of the year little better to the bees than a barren waste. In the early autumn it is the custom of many of the bee-keepers of the Lowlands of Scotland to despatch their hives in spring-carts of easy motion, or on hand-barrows, to the blooming heather of the moors and mountains, where they are allowed to remain until the heather is out of bloom. The honey is obtained from the bar-frame hives by simply lifting out the frames; it can only be got from the ordinary skep by stupefying the bees with the smoke of the common puff-ball or chloroform, or by fumigating the hive with sulphur, which entails the destruction of the swarm. When their stores of honey are removed the bees must be fed during the winter and part of spring with syrup, or with a solution consisting of 2 lbs. loaf-sugar to a pint of water, and it must be borne in mind that to stint the bees in food is very bad economy. In the early spring slow and continuous feeding (a few ounces of syrup each day) will stimulate the queen to deposit her eggs, by which means the colony is rapidly strengthened, and throws off early swarms. New swarms may make their appearance as early as May and as late as August, but swarming usually takes place in the intervening months. The swarms are usually hived, when they alight in any convenient spot, by placing above them a clean hive rubbed inside with honey or sugar and water, or if they alight on a branch that can be cut off they may be gently shaken into the hive. When they collect where they cannot be shaken off, or where the hive cannot be placed near, they may be brushed quickly into a gauze sack, or any vessel in which they could be kept, and carried to the hive. Bees

are not apt to sting while swarming, and can be handled by a skilful apiarian, unprotected by gloves and veil, with impunity. The pain of a sting may be relieved by the application of ammonia or the slice of an onion.

APICIUS, M. GABIUS, an epicure in the time of Augustus and Tiberius. He had the most delicate table in Rome, proved his genius for cookery by the invention of new dishes, and at last, when he had exhausted his vast fortune, and had *only* about £80,000 left, he poisoned himself, that he might not die of hunger. He had devoted about £800,000 to the cause of gluttony. There were two other notorious epicures of the same name at Rome. The book of cookery, however, entitled De Arte Coquinaria, published under the name of Apicius, was written by one Cælius, who assumed the nickname Apicius.

APION, surnamed *Plistonicles*, was a Greek grammarian, and lived in the reigns of Tiberius, Caligula, and Claudius, A.D. 15–54. He was a native of Oasis, in Egypt, studied at Alexandria, and afterwards betook himself to Rome to teach grammar and rhetoric. He was famed as an interpreter of Homer, and was praised by the ancients for his great learning, but he is said to have been extremely vain. Among his works, none of which remain, was one directed against the Jews, which is known only by the reply to it contained in the two books of Jewish Antiquities by Josephus, entitled Against Apion.

APIS (Egyptian, *Hapi*), a bull to which divine honours were paid by the ancient Egyptians, chiefly at Memphis, and which was regarded as the representative of Osiris. According to the belief of the people, a cow became pregnant of him by a beam of light from heaven, coming particularly from the moon. It was necessary that he should be black, with a triangle of white on the forehead, a white spot in the form of a crescent on the right side, and a sort of knot like a beetle under his tongue. Other marks are also mentioned. When a bull of this description was found he was fed four months in a building facing the east. At the new moon he was led to a splendid ship with great solemnity, and conveyed to Heliopolis, where he was fed forty days more by priests and women, who performed before him various indecent ceremonies. From Heliopolis the priests carried him to Memphis, where he had a temple, two chambers to dwell in, and a large court for exercise, while a number of choice cows formed, as it were, his harem. His actions were thought to have prophetic significance, and he was believed to impart prophetic power to the children about him. The omen was good or bad according as he went into one stable or the other. His birthday was celebrated every year, when the Nile began to rise. The festival continued for seven days, and it was said that the crocodile was always tame as long as the feast continued. Notwithstanding all this veneration, the bull was not suffered to live beyond twenty-five years, the reason of which is probably to be found in the astronomical theology of the Egyptians. He was then killed and thrown into a fountain, the situation of which was kept a profound secret by the priests. The death of Apis, however, excited universal mourning, which continued till the priests had found a successor to him. As it was extremely difficult to find one with all the above distinctions, fraud was often practised by the priests.

APOCALYPSE (Greek, *apokalypsis*, from *apokalyptō*, I reveal), the name frequently given to the last book of the New Testament, containing an account of the visions of St. John the evangelist; in the English version of the Scriptures the book is called The Revelation of St. John the Divine. It is generally believed that the Apocalypse was written by John in his old age, at the end of the first century (95–97 A.D.), in the Isle of Patmos, whither he had been banished by the Roman Emperor Domitian. Though the book was commonly regarded as genuine in the first centuries of Christianity, critics have not been wanting who have doubted the evidence of its being the work of St. John. Its genuineness was maintained by Justin Martyr (circa 150), Irenæus (195), Clement of Alexandria (200), Tertullian (207), and many others; while it was doubted by Dionysius of Alexandria (240), Cyril of Jerusalem, Chrysostom, and, nearer our own times, by Luther and a majority of the eminent German commentators. In recent times many have contended for a composite authorship, and some have regarded it as a Jewish work adapted by a Christian writer. The Apocalypse, on account of its metaphorical language, has been explained differently by almost every writer who has ventured to interpret it; and for the same reason it is one of those parts of the Bible which has furnished all sorts of sects and fanatics with quotations to support their creeds or pretensions. There can be no doubt that the hopes of the early Christians and the severe persecution they endured led them to regard the Roman Empire as the object of prophetic denunciation, and the coming of Christ and the millennium as near at hand. When, under Constantine, however, the Christians became dominant and prosperous, the empire was considered as the scene of a millennial development, and in course of time the barbarous hordes who were closing round Rome were regarded as fulfilling the woes predicted in the Apocalypse. At the Reformation the Protestants identified Babylon with Papal Rome, and the second beast of Antichrist with a universal pontiff. The modern interpreters may be divided into three schools: namely, the *historical school*, who hold that the prophecy embraces the whole history of the church and its foes from the time of its writing to the end of the world; the *Præterists*, who hold that the whole, or nearly the whole, of the prophecy has been already fulfilled, and that it refers chiefly to the triumph of Christianity over Paganism and Judaism; and the *Futurists*, who throw the whole prophecy, except the first three chapters, forward upon a time not yet reached by the church—a period of no very long duration, which is immediately to precede Christ's second coming. The Apocalypse contains twenty-two chapters, which may be divided into two principal parts. The first, after the title of the book (ch. i. 1–3), comprises 'the things which are'—that is, the then present state of the Christian church, including the epistolary instructions and admonitions to the angels or bishops of the seven churches of Ephesus, Smyrna, Pergamos, Thyatira, Sardis, Philadelphia, and Laodicea, situated in Asia Minor. The second part comprehends a prediction of 'the things which shall be hereafter', referring either to the future state of the church through succeeding ages, from the time of the apostle to the grand consummation of all things, or to the state of the souls of men after the general resurrection.

APOCALYPTIC NUMBER, the mystic number 666, which, according to some authorities, should be 616, found in Rev. xiii. 18. As early as the second century ecclesiastical writers found that the name Antichrist was indicated by the Greek characters expressive of this number, numbers being expressed in Greek by the letters of the alphabet. By Irenæus the word *Lateinos* was found in the letters of the number, and the Roman empire was therefore considered to be Antichrist. Another solution is *Neron Kesar* (Hebrew form of Nero Cæsar). Omitting the *e's* and the *a*, not written in ancient Hebrew, we get 666 as the value of the letters.

APOCRYPHA (Greek, concealed), a term applied in various senses to denote certain books claiming a sacred character. The word *apokruphos* is used by Xenophon in the sense of *obscure, unknown, surreptitious;* St. Mark (iv. 22), St. Luke (viii. 17), and St. Paul (Col. ii. 3) use it in the sense of *secret, concealed.* A meaning of the word to the same effect is intimated by Aquila in his translation of the Hebrew Old Testament into Greek. The word became subsequently a patristic technical term to denote spurious, heretical, and unauthorized books. Up till the time of Wickliffe the uncanonical books in our old Bibles, although distinguished from the canonical books, were not designated by the term Apocrypha, but were entitled Hagiographa, Deuterocanonical, Ecclesiastical, and Antilegomena, that term being confined to spurious and forged writings of the post-apostolic age. But in the prologue to Wickliffe's version of the Bible published in 1380 he says, 'Whatsoever book in the Old Testament besides these twenty-five [enumerated by him before] shall be set among the Apocrypha—that is, without authority and belief.' These apocryphal books, by whatever name designated, were incorporated into the Greek version of the Old Testament commonly called the Septuagint, but the Great Synagogue rejected their title to Divine authority. All the copies of the Scriptures to which Christians had access during the first three centuries embraced our Apocryphal books without the least intimation that they differed either in character or authority from our canonical books. It must be distinctly understood, however, that they were never formally admitted into the canon of Holy Writ by any of the great councils of the early Christian church. The Greek Church excluded them from the canon in 360 at the Council of Laodicea. The Latin Church treated them with more favour, but it was not until 1546 that they were formally admitted into the canon of the Church of Rome by a decree of the Council of Trent. The Anglican Church (sixth article) says they may be read for example of life and instruction of manners, but that the church does not apply them to establish any doctrine. When printed along with the English version of the Bible these books were placed after the canonical books of the Old Testament. In consequence of a violent controversy which was carried on in Scotland in 1825 and following years as to whether the Apocrypha should still occupy that place in the Sacred Volume the British and Foreign Bible Society resolved in future to employ its funds for the circulation of the canonical Scriptures only.

The following fourteen books form the Apocrypha of the English Bible, and are given in the order in which they stand there:—The first and second Books of Esdras, Tobit, Judith, the rest of the Book of Esther, the Wisdom of Solomon, the Wisdom of Jesus the son of Sirach, or Ecclesiasticus, Baruch the Prophet, the Song of the Three Children, Susanna and the Elders, Bel and the Dragon, the Prayer of Manasses, and the first and second Books of Maccabees. These books possess a value to the Biblical student which can hardly be overrated. They present to us phases of Jewish life and thought as influenced by their contact with the manners, customs, and beliefs of the Assyrians, Persians, Egyptians, Grecians, and Romans. Now and again, too, they also throw vivid flashes of light on certain obscure expressions in the canonical books. Besides the Apocryphal books of the Old Testament there are many spurious books composed in the earlier ages of Christianity, and published under the names of Christ and his apostles, or of such immediate followers as from their character or means of intimate knowledge might give an apparent plausibility or procure a ready circulation for such forgeries. These writings comprise: 1st, the Apocryphal Gospels, which treat of the history of Joseph and the Virgin before the birth of Christ, of the infancy of Jesus, and of the acts of Pilate; 2d, the Apocryphal Acts of the Apostles; and 3d, the Apocryphal Apocalypses. It is worthy of remark that it was from the Apocryphal Gospels that Mohammed derived all his knowledge of the life of Christ; indeed, he does not seem to have been at all acquainted with the canonical Gospels; and the legends of the East in general concerning our Lord are all from Apocryphal sources. The Apocryphal books of the New Testament have never been printed in connection with the Bible by either the Roman Catholic or the Protestant Church.

APOCYNACEÆ, an extensive natural order of monopetalous exogenous plants, characterized by perfectly symmetrical flowers, the segments of the corolla all twisted one way like a Catherine-wheel, five distinct stamens, a superior ovarium, which when ripening opens into two parts that diverge from each other at right angles; fruit follicular or capsular, or drupaceous or baccate, double or single. The order consists of trees or shrubs, many of whose stems yield, when wounded, a copious milk, generally poisonous. They are generally found in tropical regions; they appear to be most abundant in the hot parts of Asia, are less common in the tropics of America, and still more rare in Africa. About 100 genera, including 566 species, have been enumerated. The plants of this order are in many cases poisonous, and very generally to be suspected, although in some cases they are used medicinally, and in others have an edible fruit. One of the most deadly plants of the order is the *Tanghina venenata.* The kernel of the fruit, although not larger than an almond, is sufficient to kill twenty men; it was formerly used in Madagascar as an ordeal. The common oleander (*Nerium Oleander*) is a formidable poison; death has resulted from eating its flowers; its branches when stripped of their bark and used as skewers render the meat roasted on them poisonous. Seven out of twelve persons who partook of meat roasted on these skewers died. Caoutchouc, or a substance analogous to it, is obtained from *Urceola elastica* and *Willughbeia edulis,* in South America. The juice of *Tabernæmontana utilis,* the hya-hya, cow-tree, or milk-tree of Demerara, is used as milk; *Allamanda cathartica,* a native of Java and Ceylon, is emetic and cathartic; *Wrightia tinctoria* yields a dye like indigo. The periwinkles, the only representatives of this order found in this country, are astringent and acrid.

APODAL FISHES, the name applied to such malacopterous fishes as want ventral fins. They constitute a small natural family, almost coextensive with the great genus *Muræna,* of which the common eel is a familiar example.

APODICTIC, a logical term adopted by Kant from Aristotle to distinguish judgments or conclusions which are beyond contradiction from those which are merely empirical; or to put it differently, a judgment or conclusion which is founded on the impossibility of the opposite, not upon grounds of experience is an apodictic judgment.

APOGEE (Greek, *apo,* from, and *gē,* the earth), strictly, that point in the orbit of the moon which is at the greatest distance from the earth. Sometimes the sun is said to be in apogee, but it is more usual in this case to say that the earth is in aphelion. The greatest distance of any of the planets from the earth is also called its apogee. The correlative of apogee is *perigee,* that is, the point in the moon's orbit nearest the earth.

APOLDA, a town in the Grand-duchy of Saxe-Weimar, 10 miles north-east of Weimar. It is the chief manufacturing place in the grand-duchy, hosiery being extensively manufactured and exported to all parts of the world. There are also tanneries and two celebrated bell-foundries here. Pop. (1885), 18,061; (1905), 21,262.

APOLLINARIANS, in ecclesiastical history, a sect which maintained the doctrine that the Logos (the Word of God) holds in Christ the place of the rational soul, and consequently that God was united in him with the human body and the sensitive soul. Apollinaris, the author of this opinion, was, from A.D. 362 till at least A.D. 382, Bishop of Laodicea, in Syria, and a zealous opposer of the Arians. As a man and a scholar he was highly esteemed, and was among the most popular authors of his time. According to the old historians of the church, when the Emperor Julian forbade Christians the use of schools and the study of the Greek classics, Apollinaris, with his father, of the same name, a teacher of languages and a presbyter, composed imitations of them for the use of the Christians; for instance, heroic poems and tragedies, from the historical matter of the Old Testament, and dialogues in imitation of Plato's, from portions of the New. None of these works are now extant. His doctrine above mentioned was first made known A.D. 371, and has been condemned as heretical, since A.D. 375, by various councils; among others, by the ecumenical council at Constantinople, A.D. 381. Apollinaris, however, formed a congregation of his adherents at Antioch, and made Vitalis their bishop. The *Apollinarians*, or *Vitalians*, as the followers of Apollinaris and Vitalis were called, soon spread their sentiments in Syria and the neighbouring countries, established several societies, with their own bishops, and one even in Constantinople; but after the death of their leader, between A.D. 382 and A.D. 392, they separated into two parties—one, the Vitalians, who adhered to the doctrine of Apollinaris; the other, the Polemians, who assert that God and the body of Christ became one substance, and who, consequently, pay divine honours to the flesh; for which reason they were called *Sarcolatræ Anthropolatræ*, and because they confound the union of natures in Christ, *Synousiasts*. Imperial edicts, A.D. 388 and 397, forbade them to hold religious assemblies; and A.D. 428, they were wholly forbidden to have ecclesiastics or to dwell in cities. This sect, never numerous, now disappeared.

APOLLO, son of Zeus (Jupiter) and Leto (Latona), who being persecuted by the jealousy of Hera (Juno), after tedious wanderings and nine days' labour, was delivered of him and his twin sister, Artemis (Diana), on the Island of Delos. Apollo appears in mythology as the god of poetry, music, and prophecy, the patron of physicians, shepherds, and the founder of cities. Skilled in the use of the bow, he slew the serpent Python on the fifth day after his birth; afterwards, with his sister Artemis, he killed the children of Niobē. He aided Zeus in the war with the Titans and the giants. He destroyed the Cyclopes, because they forged the thunder-bolts with which Zeus killed his son and favourite Asklepios (Æsculapius). All of the male sex who were snatched from the world by a sudden and easy death, without previous sickness, were supposed to be smitten by the arrows of Apollo. In the oldest poems Apollo is exhibited as the god of song. In the festivals of the gods on Olympus, and those of men in which they took part, he plays and sings, while the Muses dance around him. According to some traditions he invented the lyre, though this is generally ascribed to Hermes (Mercury). Marsyas, who ventured to contend with him on the flute, was conquered and flayed alive by the god. Apollo had another contest with Pan, in which the former played on the lyre, the latter on the pipe. Tmolus had already decided in favour of Apollo, when Midas opposed the sentence, and was decorated with a pair of ass's ears for his stupidity. That Apollo had the gift of prophecy appears from the Iliad, where he is said to have bestowed it upon Calchas and Cassandra; and in the Odyssey mention is made of an oracular response delivered by him in Delphi. The oracle at this place became very famous. He also revealed future events at Abæ in Phocis, Didyma near Miletus, Claros near Colophon in Ionia, Tenedos, and Patara in Lycia. As medical advice was sought chiefly from oracles and soothsayers, Apollo, in later times, came to be regarded as the god of physic. He was represented to be the father of Asklepios, the god of healing. He is reported to have taken charge for a long time of the herds of Admetus, according to some authorities voluntarily, according to others compelled by Zeus, on account of the murder of the Cyclopes, or the serpent Python. As a builder of cities, the founding of Cyzicum, Cyrene, and Naxos in Sicily is ascribed to him. Homer relates that he built the walls of Troy together with Poseidon (Neptune), and afflicted the city afterwards with a pestilence, because Laomedon defrauded him of his pay. According to the descriptions of poets, and the representations of sculptors, Apollo, with Ares (Mars), Hermes (Mercury), and Dionysos (Bacchus), belongs to the beardless gods, in whom the dawnings of early manhood appear. He is figured with a bow, a quiver and plectrum, a serpent, a shepherd's crook, a griffin and a swan, a tripod, a laurel, an olive-tree, &c. Mythology relates many of his amours. (See DAPHNE.) Apollo was originally the sun-god; and though in Homer he appears distinct from Helios (the sun), yet his real nature is hinted at even here by the epithet Phœbus, that is, the radiant or beaming. In later times the view was almost universal that Apollo and Helios were identical. By this theory of his origin we can easily understand how he should be regarded as the god of pastures (Nomios) and of flocks (Karneios), the god that protects and causes the fruits of the field to grow, the god that gives fair winds to mariners (Embasios), &c. As he slew the Python, that is, the hostile powers of darkness, with his arrows (the sunbeams), so in later times he was looked on as the averter of evil, the bringer of help, and the punisher of overweening pride (as in the story of Niobe). From being the god of light and purity in a physical sense he gradually, as he became endowed more and more in the Greek mind with an ethical character, became the god of moral and spiritual light and purity, the source of all intellectual, social, and political progress. He thus came to be regarded as the god of song and prophecy, the god that purifies after the commission of crimes, that wards off and heals bodily suffering and disease, the institutor and guardian of civil and political order, and the founder of cities. Apollo was not one of the original gods of the Romans, though his worship was introduced at Rome at an early period, probably in the time of the Tarquins. Among the ancient statues of Apollo that have come down to us, the most remarkable, and in the judgment of the learned and acute Winckelmann the best and most perfect that art has produced, is the one called the *Apollo Belvidere*, from the Belvidere Gallery in the Vatican at Rome; also called the *Pythian Apollo*, because it is supposed that the artist has represented the god in the moment of his victory over the serpent Python. This statue was found in the ruins of Antium in 1503.

APOLLONIUS OF RHODES, according to some authorities, was born at Alexandria, according

to others at Naucratis, about 230 B.C. As the jealousy of other learned men incessantly persecuted him in his own country he retired to Rhodes, where he taught rhetoric with so much reputation, and obtained by his writings so much fame, that the Rhodians bestowed upon him the rights of citizenship. He returned to Alexandria to succeed Eratosthenes as superintendent of the library of that city. Of his various works we have only the Argonautica, a poem of moderate merit, though written with much care and labour. There are some passages, however, of great beauty, especially the episode on the love of Medea.

APOLLONIUS OF TYANA, in Cappadocia, a Pythagorean philosopher, about whom many wonderful stories are told. He was born in the beginning of the Christian era, early adopted the Pythagorean doctrines, abstaining from animal food and living in the simplest manner, and according to the Pythagorean precept maintained a rigid silence for five years. He travelled extensively in Asia, disseminating his doctrines and doing many wonderful things, and proceeded as far as India, where he became initiated into the doctrines of the Brahmans. On his return from India his fame everywhere preceded him, and the people came forth eagerly to meet him. He recommended community of goods, according to the doctrines of Pythagoras, and greater purity of morals. He prophesied pestilence and earthquakes at Ephesus, which afterwards really came to pass. In every place which he visited he maintained that he could prophesy and perform miracles. At last he came to Rome, where he raised a noble lady from the dead; but his stay here was short. He then visited Spain, where he originated an unsuccessful insurrection against Nero, returned through Italy to Greece, and thence to Egypt, where Vespasian made use of him for the support of his authority, and asked advice of him as of an oracle. Thence he journeyed to Ethiopia, and after his return was received as favourably by Titus, who asked his advice in all the affairs of government. When Domitian ascended the throne Apollonius was accused of having excited an insurrection in Egypt in favour of Nerva. He readily submitted to a trial, and was acquitted. After this he went once more to Greece, and passed over to Ephesus, where he opened a Pythagorean school, and died in 96, or, according to others, 110 A.D. Among the many remarkable things related of him he is said to have announced the murder of Domitian at the very moment when it happened. Our great authority for these wonderful facts is the Life of Apollonius written by Philostratus about the beginning of the third century. In the midst of its many fables and absurdities it undoubtedly contains a kernel of truth; but to distinguish the true from the false is exceedingly difficult. It is well known that temples, altars, and columns were erected to him in many cities, coins struck in memory of him, and that he shared the reverence of Alexander Severus equally with Abraham and Christ. The apologists of paganism at the period of its decline compared his life, miracles, and doctrines with those of Christ, and there have not been wanting writers of modern date who make the same comparison. There is, however, no ground for believing that Philostratus wrote the life in a spirit of hostility to Christianity.

APOLOGETICS, a term applied to a philosophical exhibition of the arguments for the divine origin of Christianity. (See APOLOGY.) Works on apologetics are to be carefully distinguished from polemical writings, which have for their object only to maintain the peculiarities of one religious sect or party against another. Among the chief English works as apologetics are Butler's Analogy, Lardner's Credibility of the Gospel History, Paley's Evidences, Bishop Watson's Apology for Christianity, Chalmers's Natural Theology, &c. Many of the particular problems of apologetics are discussed in the Bampton Lectures.

APOLOGUE. See FABLE.

APOLOGY, a term at one time—not so often at the present day—applied to a defence of one who is accused or of certain doctrines called in question. Of this nature are the apologies of Socrates attributed to Plato and Xenophon. Later rhetoricians wrote upon the use of apologies, and caused them to be composed by their scholars. Of this sort are the Apologies of Libanius. Thus the name passed over to Christian authors, who gave the name of apologies to the writings which were designed to defend Christianity against the attacks and accusations of its enemies, particularly the pagan philosophers, and to justify its professors before the emperors. Of this sort were those by Justin Martyr, Athenagoras, Tertullian, Tatian, and others. There are also apologies for the doctrines of particular sects; for example, Robert Barclay's Apology for the People in Scorn called Quakers.

APONEUROSIS, in anatomy, a grayish-white shining membrane composed of interlacing fibres, sometimes continuous with the muscular fibre, and differing from a tendon merely in having a flat form. The aponeuroses serve several purposes, sometimes attaching the muscles to the bones, sometimes surrounding the muscle and preventing its displacement, sometimes intersecting a muscle and being continuous with its fibres on both sides. They are poor in nerves and blood-vessels, generally insensible, but very painful when inflamed; they are flexible, but not extensile, and very difficult to tear.

APOPHTHEGM (from the Greek *apophthegma*), a short pithy sentence or maxim, as, for example, the sayings of the seven wise men of Greece. Julius Cæsar wrote a collection of them, and we have a collection by Lord Bacon. Some parts of the Bible are entirely composed of apophthegms.

APOPLEXY is the name applied to an affection of the brain, during the continuance of which consciousness and voluntary motion are wholly or partially extinguished. In a complete apoplexy the person falls suddenly, is unable to move his limbs or to speak, gives no proof of seeing, hearing, or feeling, and the breathing is stertorous or snoring, like that of a person in deep sleep. In a case of less violence the symptoms are more moderate, and the approach of the disease less sudden. Consciousness sometimes remains in part; some power of motion is retained, upon one side, or in some parts at least; the speech is not entirely lost, but is only an unintelligible muttering of incoherent words. Although an attack may come on suddenly, as in most cases it does, yet it is often preceded by appearances and sensations which give warning of its approach. The patient, if of full habit, suffers from headache or giddiness, especially on stooping or after having slept much and heavily; the mental faculties have been sluggish, the memory affected, or vision impaired; there may be numbness or pricking in a limb or in a finger only; the face and eyes look full and red. If he is of spare habit there may also be headache, giddiness, and confusion; but there will be, in addition, marked debility of the mental powers, the faculty of following a consecutive train of thought will be impaired, articulation indistinct, the face pale, the pulse weak, the whole manner inanimate rather than oppressed. Apoplexy occurs most frequently in persons of the male sex, owing to their habits and greater exposure to the exciting causes; most commonly within the period between the ages of forty and seventy, but

it is not infrequent at both earlier and later epochs. A large head, short neck, full chest, sanguine and plethoric constitution, and corpulency are generally considered signs of predisposition to it; but the state of the heart's action and of the circulation through its cavities, with a plethoric state of the vascular system, has a more marked influence. Out of sixty-three cases minutely analyzed by an eminent authority only ten were fat and plethoric persons, twenty-three were thin, and thirty were of the ordinary habit of body. Long and intense thought, depressed and anxious states of the mind; the habitual indulgence of the temper, passions, and appetites; the irritable and sanguine temperaments; sedentary and luxurious living; too great sexual indulgence, especially when combined with full living; habits of intoxication, laborious employments, especially when they require much stooping; diseases of the heart, liver, lungs, kidneys, and the digestive organs; sudden vicissitudes of temperature, frequent indulgence of sleep after a full meal, the use of articles of clothing which compress the neck, lying with too low a pillow, or lying too long in bed, are among the most common predisposing causes of apoplexy. The termination and effects of the disease vary with the violence of the attack; and it is either fatal in a few hours or after a few days, during which a degree of fever is often observed, or the patient recovers entirely, or with a weakness or lameness of one or more limbs. Genuine complete apoplexy is produced by the pressure of blood (whether extravasated or not) upon the brain. It is at all times a disease of great danger, but by no means always fatal; and those affected by it sometimes recover as entirely as from any other complaint, although some lameness or defect of motion is apt to remain, either in the limbs, the organs of speech, the eyes or mouth, or some other part. A fatal result is to be anticipated when the consciousness and feeling are entirely lost, when the eye is insensible to light and the pupil does not contract, when the patient cannot swallow, the respiration grows more laborious, and froth or blood appears at the mouth or nose. But if, on the contrary, the remedies used appear to afford relief, and produce a gradual diminution of the symptoms above described, a favourable result may be expected. When a person is attacked by apoplexy the first step should be to open the cravat and collar, so as to leave the neck free, and the patient's head should be raised; some doctors recommend bloodletting, but this is not now generally resorted to, and in fact little can be done while the fit lasts. Palsy is sometimes a consequence of apoplexy, but it is more commonly produced by causes of a different character, and constitutes a different disease. See PALSY.

APOSTASY (Greek, *apostasis*, a standing away from), a renunciation of opinions or practices, and the adoption of contrary ones, usually applied to renunciation of religious opinions. It is always an expression of reproach. What one party calls *apostasy* is termed by the other *conversion*. History mentions three eminent apostates—Julian the Apostate, who had never been a Christian, except nominally and by compulsion; Henry IV., king of France, who thought that 'Paris vaut bien une messe', and that of course all France was worth the whole Catholic faith; and William of Nassau, the stadtholder, who separated himself from the Roman Catholic Church and became a Protestant. R. Catholics, also, call those persons apostates who forsake a religious order or renounce their religious vows without a lawful dispensation. The statute 9 and 10 of William III. cap. xxxii., provides that if any person educated in or having made profession of the Christian religion shall deny it to be true, he shall be rendered incapable of holding any office for the first offence, and for the second shall be made incapable of bringing any action, of being guardian, executor, legatee, or purchaser of lands, and shall suffer three years' imprisonment without bail. This act is commonly called the 'blasphemy act'. But penal laws of this sort relating to religion have generally lain dormant in England. See BLASPHEMY.

A POSTERIORI. See A PRIORI.

APOSTLES (literally persons sent out, from the Greek *apostellein*, to send out), in the Christian church, the twelve men whom Jesus selected to attend him during his ministry, witness his miracles, learn his doctrines, and thus be able to promulgate his religion. Their names were as follows:—Simon Peter and Andrew his brother; James the greater, and John his brother, who were sons of Zebedee; Philip of Bethsaida; Bartholomew; Thomas; Matthew; James, the son of Alpheus, commonly called *James the less*; Lebbeus, his brother, who was surnamed *Thaddeus*, and was called *Judas* or *Jude*; Simon the Canaanite; and Judas Iscariot. Of this number Simon Peter, John, James the greater, and Andrew were fishermen; and Matthew, a publican or tax-gatherer. When the apostles were reduced to eleven by the suicide of Judas, who had betrayed Christ, they chose Matthias by lot on the proposition of St. Peter. Soon after, their number became thirteen by the miraculous vocation of Saul, who, under the name of *Paul*, became one of the most zealous propagators of the Christian faith. The Bible gives the name of apostle to Barnabas also, who accompanied Paul on his missions (Acts xiv. 14), and Paul seems to give it to Andronicus and Junia, his relations and companions in prison. Generally, however, the name is used in the narrower sense to designate those whom Christ selected himself while on earth, and Paul, whom he afterwards called. In a wider sense those preachers who first taught Christianity in heathen countries are frequently termed apostles, for example, St. Denis, the apostle of the Gauls; St. Boniface, the apostle of Germany; St. Augustine, the apostle of England; the Jesuit Francis Xavier, the apostle of the Indies; Adalbert of Prague, apostle of Prussia. Proper. St. Paul was the only apostle who had received a good education. Questions have often been started respecting the domestic circumstances of the apostles. Were they very poor? Were they married? &c. Our information on these points is very limited. Some eminent theologians have thought that they were not poor, and that they possessed a common fund sufficient to meet any expenses. Of this some indications exist. Tradition reports that several of the apostles were married. The wife of St. Peter is said to have accompanied him on his journeys, and died a martyr. The tradition further states that St. Peter had a daughter Petronilla, who was also a martyr; this at least say St. Augustine, St. Epiphanius, and St. Clement of Alexandria. St. Philip also is said to have been married, and to have had several daughters, among whom was St. Hermione. Hegesippus speaks of two martyrs, grandsons of St. Jude. His wife was called Mary. St. Bartholomew is also said to have been married. But tradition affords almost our only authority respecting their private lives. During the life of the Saviour the apostles more than once showed a misunderstanding of the object of his mission, and during his sufferings evinced little courage and firmness of friendship for their great and benevolent Teacher. After his death they received the Holy Ghost on the day of Pentecost, that they might be enabled to fulfil the important duties for which they had been chosen. Their subsequent lives the Catholic Church represents as follows, partly on the authority of the book of Acts, mostly on that of

tradition:—St. John made some excursions into Asia, and preached among the Parthians and in India. In the reign of Domitian he was carried to Rome, tortured, and exiled to Patmos, where he wrote the Apocalypse. He died in Ephesus. St. Bartholomew travelled through India, Persia, Abyssinia, Arabia Felix, and finished his course in Armenia. St. Philip preached in Phrygia; St. Thomas in Media, Caramania, Bactria, in India, and even in China; but this last fact is not positively asserted. St. Matthew preached in Ethiopia. St. Simon, say the Greeks, after having baptized in Egypt, Cyrenaica, Libya, and Mauritania, went to England, and thence to Persia, where he died. St. Jude preached in Syria, Mesopotamia, Persia, Armenia, and Libya. St. Peter, afterwards Bishop of Antioch, and then of Rome, visited Asia Minor, and also Babylon, as one of his epistles shows (unless Babylon means Rome). St. Paul visited Asia Minor, Greece, and Rome. The two Jameses seem not to have gone far from Jerusalem; yet the body of James the greater is said to be buried at Compostella in Spain. According to Matthew (xvi. 18) Christ seems to appoint St. Peter the first of the apostles; and it is known that the pope claims his unique position in the church from the power which Christ gave to St. Peter, of whom all the popes, according to the Catholic dogma, are successors in an uninterrupted line.

APOSTOLICAL, all that comes from the apostles, or has relation to them. Thus the apostolical writings are writings composed by the apostles. The earlier Christian church was called the *apostolical church*, because the apostles at first conducted it, and after their death their spirit remained in it. So also the papal see is called the *apostolical see*, because it is supposed to have been founded by the apostle Peter.—The *apostolical office* at Rome is the name of the office which manages the papal revenues.—The *apostolical blessing* is the blessing bestowed by the pope, as successor of Peter.—The King of Hungary is styled *apostolical king*, *apostolical majesty*. Pope Sylvester II. bestowed this title on Stephen I., duke of Hungary, A.D. 1000, because he not only greatly promoted the Christian religion in Hungary, but also preached himself. Clement XIII. renewed the memory of this occurrence by giving Maria Theresa the title of *apostolical queen* in 1758.

APOSTOLICAL (or APOSTOLIC) FATHERS, the name given to approved Christian writers, who were either contemporaneous with the apostles, or immediately followed them. It is usually confined to Barnabas, Clement of Rome, Ignatius of Antioch, and Polycarp of Smyrna, but is also sometimes understood to include Papias of Hierapolis, and the author of the Shepherd, who is supposed to be the Hermas mentioned in Rom. xvi. 14. Among the best editions of the works of the apostolic fathers are those by Cotelerius (two vols. fol. Paris, 1672), by Dr. Jacobson (third edition, two vols. Oxford, 1847), and by Hefele (third edition, one vol. Tübingen, 1855). Translations are given in Clark's Ante-Nicene Christian Library; see also Hilgenfeld's Apostolische Väter, 1853, and Donaldson's Apostolical Fathers, 1874.

APOSTOLIC CANONS, a collection of eighty-five ecclesiastical precepts relating chiefly to priestly life and the sacred offices, partly extracted from the Scriptures and partly from the Synodical decrees. They were probably collected in Syria between the end of the fourth and the middle of the fifth century. The Greek Church accepts the entire collection; but the Romish Church accepts only the fifty canons which were translated from Greek into Latin by Dionysius the younger, and included in this collection of canons.

APOSTOLIC CONSTITUTIONS, a collection of ecclesiastical rules and precepts in eight books, which, though never fully accepted by the church, have had considerable influence on the development of Christian dogma, liturgy, and discipline, and from which we derive much valuable information respecting the constitution of the church in the second and third centuries. From the searching inquiries made as to the time and country in which these regulations were collected, it is known that the first six books (composed in Greek) were written about the end of the third century; the remaining two date from the beginning of the fourth century. A recent edition of the Greek Constitutions was published by Lagarde (Leipzig, 1862).

APOSTOLICS, APOSTOLICI, or APOSTOLIC BRETHREN, the name of three sects who professed to imitate the manners and practice of the apostles. The first flourished at the close of the second century. They had all things in common. Little else is known of their peculiar tenets.—The second sect of this name existed in the twelfth century. It was composed of people of the lower class. They were numerous, and their lives, as Bernard admits, were exemplary. Their peculiarities were as follows:—They held it to be unlawful to take oaths; they suffered their hair and beards to grow to an enormous length; they preferred celibacy to wedlock, calling themselves the *chaste brethren and sisters;* each man, however, had a spiritual sister, with whom he lived in concubinage. —The third sect of Apostolici was founded about 1260 by Gerhard Segarelli. They went barefooted, begging, preaching, and singing throughout Italy, Switzerland, and France; announced the coming of the kingdom of heaven and of purer times; had females in their retinue, as the apostles had their female companions, and were suspected of unlawful intimacy with these sisters. This society was formally abolished, A.D. 1286, by Honorius IV. Though they were persecuted by the Inquisition they continued in existence, perpetually wandering about; and when Segarelli was burned as a heretic, A.D. 1300, another chief apostle appeared—Dolcino, a learned man of Milan—who encouraged the sect, now increased to 1400 men, with prophetic promises. To defend themselves they stationed themselves in fortified places (about the year 1301), whence they might resist attacks. In the plundering habits which they were forced to adopt they wholly lost the original design of their institution, and after having devastated a large tract of country belonging to Milan, they were subdued, A.D. 1307, by the troops of Bishop Raynerius, in their fortress Zebello, in Vercelli, and almost all destroyed. Dolcino was burned. The survivors afterwards appeared in Lombardy and in the south of France as late as A.D. 1368. Their heresy consisted in reviling the pope and the clergy.

APOSTOLIC SUCCESSION. See BISHOP and ORDINATION.

APOSTROPHE (Greek, 'a turning away from'), a figure of speech which received this name from the ancients, because the orator, in using it, turned from the judge to the accuser, or the accused, and spoke to him. We now usually understand by this rhetorical figure a direct address to a person present, or absent, or dead, or to things without life and sense as if they had life and sense. The same term is also applied to a comma when used to contract a word, or to mark the possessive case.

APOTHECARY, in a general sense, one who keeps a shop or laboratory for preparing, compounding, and vending medicines, and for the making up of medical prescriptions; but in England apothecaries also visit and prescribe for the sick, and are a regularly-licensed class of medical practitioners. Apothecaries are mentioned at an early period in English history. In 1345 Coursus de Gangeland, an apothecary of London,

received the grant of a pension of 6*d.* a-day from Edward III. for having successfully attended the king when in Scotland. It was long, however, before the different branches of the medical profession were properly distinguished, and the rights and privileges of each established by law. Thus the apothecaries were at one time confounded with the grocers, with whom they were incorporated by James I. in 1606. In 1617, however, the two bodies were separated, and the apothecaries received a new charter as a distinct company, being then styled the Master, Wardens, and Society of the Art and Mystery of Apothecaries of the City of London. The members of the society were not yet regarded as having the right to prescribe, but only to dispense, medicines; and when, towards the close of the seventeenth century, they began to take upon them the former function, they met with much opposition from the physicians. The practice became so general, however, that in 1703 the House of Lords decided that 'the duty of an apothecary consisted not only in compounding and dispensing, but also in directing and ordering, the remedies employed in the treatment of disease'. They could scarcely avoid indeed giving medical advice on occasions, and it was chiefly among the poor, who had most need of their services, that their practice lay. In 1748 an act was passed, providing that the Apothecaries' Company should appoint ten of their members to form a body of examiners, without whose license no one was to be allowed to vend medicines in London, or within 7 miles of it. So well established as a branch of the medical profession did the apothecaries at length become, that we find them in 1812 complaining—just as the physicians had previously done in regard to *them*—that the chemists and druggists were encroaching on the province of the apothecaries by visiting and prescribing for the sick. In 1815 an act was passed which entirely altered the position of the Society of Apothecaries, inasmuch as it provides that no person shall practise as an apothecary, or act as assistant to an apothecary, in any part of England or Wales, unless he shall have served an apprenticeship of five years with a member of the society, and shall have been examined by, and received a certificate from, the society's court of examiners. Seeing that in country places every practitioner must be to a certain extent an apothecary, and keep a supply of drugs, this act gave the society an undue influence over the medical profession; persons otherwise perfectly qualified, such as licentiates of the Royal College of Surgeons of London, graduates of the Scotch universities, or of the University of Dublin, being now virtually prohibited from acting as country practitioners, unless they had served five years in the shop of a member of the society, and undergone the examination prescribed by that body. Dissatisfaction with this provision of the act of 1815 long prevailed, and much agitation for its alteration took place; but nothing of importance was done till the passing of the Medical Act of 1858, which brought the desired reform. (See MEDICAL ACT.) The apothecaries have prescribed a course of medical instruction and practice which candidates for the license of the society must pass through in order to obtain it. The course must extend over three winter and two summer sessions at least; and the candidate must pass a satisfactory examination in Latin, including the pharmacopœia and physicians' prescriptions, anatomy, physiology, chemistry, botany, materia medica, practice of medicine and pathology, midwifery, forensic medicine and toxicology. The act of 1815 was further amended by 37 and 38 Victoria, cap. xxxiv. (16th July, 1874), which gives facilities to the Society of Apothecaries for co-operating with other medical licensing bodies, and also gives the society the right of erasing the names of disreputable persons from the list of its licentiates. The act also settles that it is now no longer necessary to have served an apprenticeship under an apothecary for five years before a candidate can undergo an examination for a certificate to practise. Persons holding the license of the Society of Apothecaries, or of the Apothecaries' Hall of Ireland, now occupy a position similar to that of others duly qualified to practise medicine.

APOTHEOSIS (deification), a solemnity among the ancients by which a man was raised to the rank of the gods. The custom of placing mortals, who had rendered their countrymen important services, among the gods was very ancient among the Greeks, who generally followed, in so doing, the advice of an oracle. On their coins most of the founders of cities and colonies are immortalized as gods; and in subsequent times living princes assumed this title. The Romans, for several centuries, deified none but Romulus, and first imitated the Greeks in the fashion of frequent apotheosis after the time of Cæsar. From this period apotheosis was regulated by the decrees of the senate, and accompanied with great solemnities, among which was the letting loose of an eagle as the body was being consumed on the funeral pile. The ceremony was called among the Romans *consecratio*, and the deified person *divus*. There are still many monuments extant exhibiting the Roman apotheosis. The greater number of the Roman emperors were deified. The savage Nero deified the beautiful Poppæa, his wife, after having killed her by a kick; and Caracalla, having murdered his brother Geta with his own hands in his mother's arms, granted him divine honours, accompanied with the blasphemous remark—'Sit divus, dum non sit vivus'. Altars were built to Augustus among the Gauls even in his lifetime; and with the progress of servility, temples were built at Rome to the reigning tyrant. Caligula was not satisfied with being honoured as a god, but would assume the character of all the gods in turn. Constantine had the double advantage of being deified by the religion which he had abandoned, and canonized by that which he supported. It was even not unusual for Christian emperors to have altars, and be adored by their pagan subjects. The practice of deifying the emperors 'appears to have arisen from the opinion which was generally entertained among the Romans, that the souls or manes of their ancestors became deities; and as it was common for children to worship the manes of their fathers, so it was natural for divine honours to be publicly paid to a deceased emperor who was regarded as the parent of his country'.

APPALACHIAN MOUNTAINS. See ALLEGHANY MOUNTAINS; but we may here mention that the latter name is sometimes restricted to a portion of the chain, namely, that which traverses the states of Virginia, Maryland, and Pennsylvania. This portion has a mean elevation of 2500 feet, but in Virginia rises to over 4000.

APPALACHICOLA, a river of the United States, formed by the Chattahoochee and Flint Rivers, which unite near the northern border of Florida. The Appalachicola, after a course of about 75 miles, flows into St. George's Sound, in the Gulf of Mexico, and is navigable throughout for vessels of considerable size. The Chattahoochee, the western and largest tributary of the Appalachicola, rises in the Appalachian or Alleghany Mountains, on the confines of Georgia and Tennessee, and is navigable for boats nearly 400 miles from the Gulf of Mexico.

APPARENT, among mathematicians and astronomers, denotes things as they appear to the eye, in distinction from what they really are. Thus they speak of apparent motion, magnitude, distance, height,

&c. So important is this difference between reality and appearance, particularly in regard to the heavenly bodies, that we find all early astronomers, who were ignorant of this fact, running continually into error; and a great advancement in science was required before mankind were able to establish systems opposed to appearances. Every one knows that a body may appear to move while it is, in fact, at rest, and the motion is in the spectator, or the place on which he stands, as is the case with the sun in relation to the inhabitants of this earth.

The phrase *heir apparent* signifies one whose right of inheritance is indefeasible, provided he survive his ancestor; as the eldest son or his issue, who must, by the course of the common law, be heirs to the father. *Heirs presumptive*, are those who, if the ancestor should die immediately, would in the present state of things be his heirs.

APPARITION, a spectral illusion involuntarily generated, by means of which figures or forms, not present to the actual sense, are nevertheless depictured with a vividness and intensity sufficient to create a temporary belief of their reality. It is now generally held to be the result of the reaction of an excited imagination, renovating past feeling or impressions, with an energy proportioned to the degree of excitement; arranging them often in new and fantastical groups; and thus surrounding us with a phantasmagoria of the bodiless creation of the brain, so distinct both in outline and lineament, that while the existing cause continues to operate, the illusion of reality predominates over the mind with an intensity generally equal to, sometimes greater than, that of the impressions produced by actual perceptions. But although the illusion thus generated is necessarily co-existent with the state of excitement in which it has its origin, or, in other words, ceases to be active when the spectral phenomena vanish, it does not therefore follow that the mind, when it regains its ordinary condition, becomes immediately sensible of the hallucination under which it has for a time been labouring, or capable of distinguishing between the perceptions of sense and the phantasms of imagination. On the contrary, observation proves, what theory equally sanctions, that the conviction of reality generally outlasts the impressions which originally produced it; and that, so far from any suspicion of illusion being entertained, or any power of discriminating the actual from the imaginary being evinced, this conviction takes entire possession of the mind, and in many instances maintains its hold with a firmness which all the force of argument and reason is insufficient to overcome. Hence the tenacity, and, we may add, the universality of the belief in apparitions; and hence also the prodigious diversity of forms under which these spectral illusions are presented in the popular legends and superstitions of different ages and countries;—a diversity, in fact, which seems commensurate with the incredible variety of influences, whether morbific or other, by which the imagination may be excited, and past feelings or impressions vividly renovated in consequence of its reaction on the organs of sense. Sir D. Brewster has remarked, as a physical fact, that 'when the eye is not exposed to the impressions of external objects, or when it is insensible to these objects, in consequence of being engrossed with its own operations, any object of mental contemplation, which has either been called up by the memory or created by the imagination, will be seen as distinctly as if it had been formed from the vision of a real object. In examining these mental impressions,' he adds, 'I have found that they follow the motions of the eyeball exactly like the spectral impressions of luminous objects, and that they resemble them also in their apparent immobility when the eyeball is displaced by an external force. If this result shall be found generally true by others it will follow that the objects of mental contemplation may be seen as distinctly as external objects, and will occupy the same local position in the axis of vision as if they had been formed by the agency of light.' This goes to the very root of the theory of apparitions, all the phenomena of which seem to depend upon the relative intensities of the two classes of impressions, and upon the manner of their accidental combination. In perfect health the mind not only possesses a control over its powers, but the impressions of external objects alone occupy its attention, and the play of imagination is consequently checked, except in sleep, when its operations are relatively more feeble and faint. But in the unhealthy state of the mind, when its attention is partly withdrawn from the contemplation of external objects, the impressions of its own creation, or rather reproduction, will either overpower or combine themselves with the impressions of external objects, and thus generate illusions which in the one case appear alone, while in the other they are seen projected among those external objects to which the eyeball is directed, in the manner explained by Sir D. Brewster. We may add that the same reasoning which applies to the impressions derived from the sense of sight is equally applicable to those received through the medium of any other sense,—as the ear, for instance, an organ which ministers abundantly to the production of spectral illusions. This theory explains satisfactorily a large majority of the stories of apparitions; still there are some which it seems insufficient to account for, and the subject still demands further investigation. In recent times, though the belief in ghosts of the old and orthodox class may be said to have almost died out, a new and kindred faith has arisen, that of Spiritualism. See SPIRITUALISM, FAIRIES, &c.

APPEAL, in legal phraseology, signifies the removal of a cause from an inferior tribunal to a superior, in order that the latter may revise, and if it seem needful reverse or amend, the decision of the former. The supreme court of appeal for Great Britain is the House of Lords. Till recently there were certain defects in connection with the settlement of appeals by this body, but these have been remedied by the Appellate Jurisdiction Act, 1876, while a new court of appeal has also been established as a division of the Supreme Court of Judicature. Appeals in the House of Lords must now always be heard before at least three lords of appeal, those who are lords of appeal being the lord-chancellor, three lords of appeal in ordinary, appointed as such, and such peers of parliament as hold or have held high judicial office. The non-legal members of the house have still a technical right to vote on judicial matters, but seldom do so. The lords of appeal may sit and determine appeals during the prorogation or dissolution of parliament. The special court of appeal above mentioned consists of four *ex-officio* judges (the lord-chancellor, the lord chief-justice, &c.) and five lords justices of appeal. This court has jurisdiction to hear and determine appeals from any judgment or order of the High Court of Justice, with certain limitations. To the High Court of Justice, established at the same time as the Court of Appeal, was transferred the jurisdiction of the Courts of Chancery, King's Bench, Exchequer, Common Pleas, Probate, Divorce, and Admiralty; and the cases which would formerly have been dealt with by these separate courts are now taken under one or other of the three divisions of this court, viz. the Chancery division, the King's Bench division, and the Probate, Divorce, and Admiralty division. In Ireland there are also a

Court of Appeal and High Court of Justice similar to those in England; while in Scotland the highest court is the Court of Session. From the decisions of the Indian and all colonial courts, and the courts of the Isle of Man and the Channel Islands, appeal may be had to the privy-council. Appeals from the decisions of justices of a borough or county may be made to the quarter-sessions of either respectively, in cases of summary jurisdiction, or to divisional courts of the high court upon a point of law; from quarter-sessions, county and other inferior courts, to the high court. In Scotland the Court of Session reviews the decisions of the county or sheriff courts, there being an appeal from its decisions to the House of Lords. See SUPREME COURT OF JUDICATURE.

APPELLANTS, a religious party. See JANSENIUS.

APPENDICITIS, a disease which has become well known in recent times and which would seem to be now more common than formerly, though probably it is not really so, but is only recognized more readily. It consists in inflammation of the *vermiform appendix* of the large intestine, a somewhat wormlike hollow body, several inches long, projecting from and opening into the intestine, but closed at the opposite extremity. In appendicitis proper the inflammation begins in the appendix and spreads to neighbouring parts, and thus the disease is sometimes included under the term *perityphlitis*, which more strictly belongs to inflammation connected with the cæcum, and not necessarily with the appendix. Appendicitis is usually set up by more or less hard bodies that become lodged in the appendix, especially particles of food that have not been sufficiently masticated. The disease may be very slight, lasting for a day or two, and accompanied with some pain and sickness; or it may take a severe and violent form, the result being death in a few hours. Death may also occur at a longer interval, when an abscess forms, which bursts into the abdominal cavity. There are also cases of chronic and of relapsing appendicitis, and in these removal of the organ is necessary. Some surgeons resort to removal of the appendix in all cases of the disease, and on the whole the prevalent opinion seems to be that this is the best course to take, and that an operation should be resorted to as soon as possible, since otherwise the development of the disease may have been such as to make it useless. The usual symptoms are such as pain in the belly, especially low down on the right side, fever, constipation, nausea, and vomiting; and the remedies are such as rest in bed, hot fomentations or poultices applied to the belly, with opium to relieve pain, food being given in small quantities, in the fluid form and hot.

APPENZELL, a canton of Switzerland, wholly inclosed within the territory of the canton of St. Gall; and though covering an area of only 162 square miles, divided into two independent portions, Ausser-Rhoden or Outer-Rhodes, which is Protestant, and Inner-Rhoden or Inner-Rhodes, which is Catholic. It is an elevated district, and is traversed by branches of the Alps; Mount Sentis in the centre is about 8250 feet high. It has large tracts of rich pasture-land and extensive forests of pine, and is watered by the Sitter and by several smaller affluents of the Rhine. The climate is cold, but healthy. Glaciers occupy the higher valleys. Flax, hemp, grain, fruit, &c., are produced, but the wealth of Inner-Rhodes, which is the more elevated division of the canton lies in its numerous herds and flocks—that of Outer-Rhodes in its extensive manufactures which consist of embroidered muslins, gauzes cambrics, and other cotton stuffs; also, silk goods and paper. Most of the weavers are proprietors of land, and the weaving and embroidering is carried on at home by the family. The construction of railways has now made the canton more accessible, and great numbers of strangers flock hither annually to take advantage of the whey-cure establishments of Gais, Weissbad, Gonten, Heiden, and Heinrichsbad. The inhabitants speak a peculiar dialect, which even those who are well acquainted with Swiss-German have great difficulty in understanding. The town of Appenzell (German, *Abtenzelle*, abbot's cell) is the capital of Inner-Rhodes, beautifully situated on the Sitter, with about 4500 inhabitants. Trogen is the capital of Outer-Rhodes, Herisau (14,700) its largest town. Schools are numerous, and education widely diffused. The division between the Protestant and Catholic portions of the canton has existed since 1597. They have only one vote between them, and send deputies to the federal assembly in turn. Pop. (1907), Outer-Rhodes, 55,926; Inner-Rhodes, 13,835. The former is one of the most densely peopled parts of Europe, its population being equal to more than 500 per square mile.

APPIANI, ANDREA, a painter, born at Milan, May 23, 1754, of an old and noble but poor family. He was obliged to work with scene-painters for his support and to go with his masters from town to town. In Parma, Bologna, and Florence he had an opportunity to see and study the master-works of his art and to form his style. He visited Rome three times in order to penetrate the secret of Raphael's style of fresco-painting, and soon excelled in this art every living painter in Italy. He displayed his skill particularly in the cupola of Santa Maria di S. Celso at Milan, and in the paintings representing the legend of Cupid and Psyche, which he prepared for the walls and ceiling of the villa of the Archduke Ferdinand at Monza (1795). Napoleon appointed him royal court-painter, gave him the order of the Legion of Honour and that of the Iron Crown, and made him member of the Italian Institute of Sciences and Arts. Appiani painted afterwards almost the whole of the imperial family. His best works are the fresco-paintings on the ceiling of the royal palace at Milan, allegories relating to Napoleon's life, and his Apollo with the Muses, in the Villa Bonaparte. Almost all the palaces of Milan have fresco-paintings by him. Napoleon's fall affected Appiani's fortune severely. He died in 1817 in straitened circumstances.

APPIAN OF ALEXANDRIA, governor and manager of the imperial revenues under Hadrian, Trajan, and Antoninus Pius, in Rome. He wrote a Roman history, from the earliest times to those of Augustus, in twenty-four books, of which only eleven have come down to us. The work is written in Greek, and is clear and simple in style; but it is little else than a compilation, characterized by many inaccuracies and absurd blunders.

APPIAN WAY, leading from Rome to Capua by way of Bovillæ, Aricia, Terracina, Formiæ, Minturnæ, Sinuessa, &c.; the oldest and most renowned Roman road and justly called by Statius *Regina Viarum*, the Queen of Roads. It was made by Appius Claudius Crassus Cæcus when he was censor, 313 years B.C., and afterwards extended to Brundusium by way of Beneventum. It consisted of hard, hexagonal stones, exactly fitted to one another, resting on an admirable substructure of considerable depth and there may still be seen, particularly at Terracina important remains which prove its excellent workmanship.

APPIUS CLAUDIUS CRASSUS, a Roman patrician, a member of the family of the Claudii. In 451 B.C., when the decemvirs were appointed to compose a complete legal code for Rome (afterwards

known as the Laws of the Twelve Tables), and to wield the supreme power in the state for a year, Appius Claudius was chosen one of the ten, and when the office was continued for another year he was re-elected. He and his new colleagues plotted to retain their power permanently, and at the expiry of their year of office refused either to give up their authority or appoint successors. They had ruled in a very tyrannical manner, the people were incensed against them, and the following circumstances led to their overthrow. Appius Claudius had conceived an evil passion for a damsel named Virginia, the daughter of Lucius Virginius, a respected plebeian, then absent with the army in the war with the Æqui and Sabines. As a husband and a patrician Appius Claudius could not marry Virginia, who was betrothed to Lucius Icilius, a former tribune of the people, but he determined nevertheless to gratify his lust. At his instigation Marcus Claudius, one of his clients, claimed Virginia as the daughter of one of his own female slaves and offered to prove this even to the satisfaction of her reputed father, while Appius Claudius decided that in the meantime she should remain in the custody of the claimant. This decision being directly contrary to law, and Icilius and her uncle Numitorius having exposed the decemvir's criminal designs the aspect of the people became so threatening that he was forced to leave the maiden in the hands of her family, declaring, however, that he would finally settle the case next day. Virginius, hastily summoned from the army, appeared with his daughter next day in the forum in mourning robes, and appealed to the people; but Appius Claudius, who was attended by a strong guard, again adjudged her to M. Claudius. Unable to rescue his daughter, the unhappy father snatched a knife from a butcher's stall and plunged it into her bosom, saying, 'There is no way but this to keep thee free.' Virginius escaped to the camp and with the army returned to Rome, demanding revenge. The decemvirs were deposed by the indignant people, and the government by tribunes and consuls restored, B.C. 448. Appius Claudius died in prison or was strangled, while M. Claudius was banished.

APPLE (*Pyrus Malus*), the fruit of a tree belonging to the order Pomaceæ, which is often regarded as a suborder of Rosaceæ. The apple is essentially a fruit of the colder and more temperate regions of the globe, over which it is almost universally spread and cultivated. We find that it and the commoner fruit-trees grow in the open air wherever oaks thrive; accordingly it is cultivated up to the 60th degree of N. lat. Even in the Orkney and Shetland Islands good apples grow. The tree attains a moderate height, with spreading branches; the leaf is ovate; and the flowers, terminating in umbels, are produced from the wood of the former year, but more generally from very short shoots or spurs from wood of two years' growth. The fruit is roundish, umbilical at the base, and of an acid flavour. The original of the cultivated apple is the wild-crab, which is armed with spines or thorns, has serrate leaves, and a small extremely acrid fruit, and is to be found as an indigenous tree in most of the countries of Europe. From the crab all the numerous varieties of the apple, which are cultivated so extensively in most parts of Europe and in North America, have been derived. The apple-tree is supposed by some to attain a great age. Haller mentions some trees in Herefordshire that attained 1000 years and were highly prolific; but Knight considers 200 years as the ordinary duration of a healthy tree, grafted on a crab stock and planted in a strong tenacious soil. The apple was probably introduced into Britain by the Romans, among whom it was a favourite fruit. To the facility of multiplying varieties by grafting is to be ascribed the amazing extension of the sorts of apples. The varieties at present known are considerably more than a thousand, and they have been greatly increased of late years. Many of the better sorts of English apples were probably introduced at first from the Continent. A considerable number of the names are French, either pure or corrupted, such as *nonpareil, mignonne, rennet* or *reinette.* The celebrated *golden pippin* (pippins are so called from the trees being originally raised from the *pips* or seeds), however, is considered to be of native growth. (See PIPPIN.) A variety of the apple, like that of most other plants, is considered by some to have only a limited duration; and to this they attribute the extinction or degeneracy of many sorts that are mentioned in old lists. Apples for the table are characterized by a firm juicy pulp, a sweetish acid flavour, regular form, and beautiful colouring; those for cooking by the property of forming by the aid of heat into a pulpy mass of equal consistency, as also by their large size and keeping properties; apples for cider must have a considerable degree of astringency, with or without firmness of pulp or richness of juice. The propagation of apple-trees is accomplished by seeds, cuttings, suckers, layers, budding, or grafting, the last being almost the universal practice. The stocks on which the grafts are by preference inserted are those raised from the seeds of crabs or the native tree, as being more hardy and durable than those produced from apple seedlings. The *Paradise apple* is an excellent dwarf stock. Apple-trees are grown as standards, dwarfs, espaliers, wall-trees, or balloons. The apple-tree thrives best in a rich deep loam or marshy clay, but it will thrive in any soil provided it is not too wet or too dry. It succeeds best in situations which are neither high nor remarkably low. Apple-trees are very liable to injuries by insects. The greatest enemy is the apple-bug or woolly aphis (*Aphis lanigera*), which first appeared in a London nursery in 1787 and has now spread over the whole kingdom. It is a minute insect covered with long cotton-like down, and lives in the chinks of the bark, where it multiplies rapidly. In early spring the blossom is attacked by the caterpillar of two or three small moths, causing what is called the *blight;* and when the leaves are fully expanded other caterpillars attack and feed on them. The wood of the apple-tree or the common crab is hard, close-grained, and often richly coloured. It works well and is suitable for turning and cabinet work. The fermented juice (*verjuice*) of the crab is employed in cookery and medicine, and also for purifying wax. Apples furnish an extensive commerce, being largely imported into Great Britain from the Continent and the United States and Canada.

APPLEBY, a market-town of England, capital of the county of Westmoreland, on both banks of the Eden, 28 miles S.S.E. Carlisle. It is compactly built, and the main street, called Borough-gate, is terminated at the upper end by the castle, at the lower by the church of St. Lawrence. Other buildings are the church of St. Michael, chapels, assize courts, market-house, town-hall, the grammar-school (recently rebuilt at a cost of £5000), and a hospital or almshouse for thirteen poor widows. There are water-works that cost £6000. The corporation is very ancient. Pop. (1901), 1764. The parl. div. of Appleby has a pop. of 31,480.

APPOGGIATO denotes in music, and particularly in song, a blended and not abrupt utterance of the tones, so that they insensibly glide and melt into each other without any perceptible break. It is from *appoggiare,* to lean on. Hence, also,

APPOGGIATURA, a small additional note of embellishment preceding the note to which it is

attached, and taking away from the principal note a portion of its time. It is expressed thus: and performed

APPOINTMENT, a term in English law signifying the exercise of some power, reserved in a conveyance or settlement, of burdening, selling, or otherwise disposing of the lands or property conveyed. Such a reserved power is termed *a power of appointment*. It corresponds with the expressions *reserved power* and *faculty to burden* in Scots law.

APPRAISER, a person employed to value property, and duly licensed to do so. By 13 and 14 Victoria, cap. xcvii., every person, except a licensed auctioneer, who for hire exercises the occupation of an appraiser to value property, repairs, and labour, must take out a license annually, for which he pays £2. Appraisers omitting to write and set down in figures every valuation made by them, with the full amount, on paper duly stamped, and to deliver the same to their employers within fourteen days, are liable to forfeit £50. The duties chargeable on appraisement are as follows: where the valuation does not exceed £5—3*d.*; where it exceeds £5 and does not exceed £10—6*d.*; over £10 and under £20—1*s.*; over £20 and under £30—1*s.* 6*d.*; over £30 and under £40—2*s.*; over £40 and under £50—2*s.* 6*d.*; over £50 and under £100—5*s.*; over £100 and under £200—10*s.*; over £200 and under £500—15*s.*; over £500—20*s.* No person must receive or pay for an appraisement that is not on duly stamped paper under a penalty of £20.

APPRENTICE, a young person of either sex bound by indenture to serve some particular individual or company of individuals for a specified time, in order to be instructed in some art, science, or trade. In England an infant, or person under the age of twenty-one years, cannot bind himself apprentice, so as to give his master grounds for an action against him if he leave his service or be guilty of any other breach of the indenture; and accordingly the usual way is for a relation or friend to become a contracting party to the indenture, and engage for the faithful performance of the agreement. An infant cannot be bound apprentice by his friends without his own expressed consent. In Scotland a boy under fourteen or a girl under twelve years of age cannot become a party to an indenture without the concurrence of a parent or guardian, who is surety for the fulfilment of the stipulations of the indenture; above that age they may enter into an indenture of themselves, and thereby become personally bound. An indenture is determinable by the consent of the parties to it, and also by the death, bankruptcy, or retirement from business of the master; but an executor is bound to discharge any agreement for the maintenance of an apprentice so far as he has assets, and he may bind an apprentice to another master to serve out the remainder of his time. Disobedience or misconduct of the apprentice may lead to the cancelling of the indenture by the justices, and misconduct on the master's part may have the same result. A master or mistress neglecting to provide an apprentice with the necessary food, clothing, and lodging, or unlawfully assaulting an apprentice to the injury of his health, is guilty of a misdemeanour, and is liable to imprisonment for not more than three years. In England, except in London, a master cannot discharge his apprentice; but if he has any complaint against him, or the apprentice against his master, the complainant must mak application to the sessions. By the custom of London a freeman may dismiss his apprentice for gaming, and by the law of Scotland a master may dismiss his apprentice if the latter prove 'incorrigible.' *Parish apprentices* are bound out by the guardians of the poor to suitable persons, and in this case the consent of the apprentice is not necessary. The persons selected were formerly compelled to take these apprentices. An apprentice is not allowed to enlist or enter the royal navy, and if he does he is liable to be indicted for obtaining money on false pretences, and at the expiration of his apprenticeship is required to surrender himself to a recruiting officer, failing to do which he is liable to be seized as a deserter.

APPROACHES, zigzag trenches made to connect the parallels in besieging a fortress. See FORTIFICATION, SIEGE.

APPROBATE AND REPROBATE. In the law of Scotland it is said that a person cannot approbate and reprobate the same deed; that is to say, he cannot take some benefit under a conveyance or settlement and at the same time refuse to comply with or reject the deed where it enjoins something contrary to his interest. The converse of this proposition is also true, that where a deed is rejected or set aside as invalid the party who rejects or reprobates it can claim no interest under any clause or provision in his favour therein contained. Thus where an heir has set aside, on the plea of execution on death-bed, a conveyance of heritage by his ancestor to his prejudice, he can have no right to any legacy or other bequest of movables bestowed on him by the deed. There is one exception to this rule, established by a decision of the House of Lords in a case appealed to that court. Where a death-bed deed (see WILL) has been made expressly revoking a previous deed to the prejudice of the heir-at-law, but making a new disposition to his prejudice, the heir may insist on the validity of the death-bed deed so far as it revokes the former one, but may reject the deed so far as it would operate to prevent him from inheriting as heir. Where, however, the revocation of the former deed is only implied, and not made in an express clause of the death-bed deed, the heir is not allowed to render void, or, in Scotch legal phraseology, reduce the latter deed, on the ground that if that deed were out of the way the former would still subsist. In the law of England a similar doctrine to that of approbate and reprobate holds, under the name of *election*, only there is no such exception as that just mentioned in the application of the law in Scotland. But there is another peculiarity in the English law worthy of notice. Where a deed is designed to convey real property, but is from some cause inoperative to do so, the heir-at-law is not put to his election between his rights as heir and his claims under the deed, unless there is an express condition attached to the bequest in his favour that he shall convey the real property according to the wish of the testator. An heir may thus, except where there is such a condition, both inherit the real property as heir and benefit by the provisions of the will in his favour.

APPROPRIATION. See IMPROPRIATIONS.

APPROVER, a term applied in English law to any accomplice in a crime who is allowed by the judges of jail-delivery to become king's evidence, that is, to be examined in evidence against his accomplices, it being understood that the approver will himself be pardoned upon making a full and open confession. If an approver, after having confessed, and being admitted to give evidence, fails to disclose all particulars, or denies what he previously confessed, he forfeits all claim to protection, and may be tried and convicted on his own confession. The evidence of an approver is always looked upon with suspicion, and as a rule the jury are advised by the judge to disregard such evidence, unless it is con-

firmed in some material point by evidence of a more satisfactory character. In Scotland, where *socius criminis* corresponds to approver, the evidence of the confessing accomplice cannot in any case be used against him, though he may be committed for contempt or indicted for perjury if, after being put into the witness-box, he refuse to make confession or deny his former statement.

APPROXIMATION, a term used in mathematics to signify a continual approach to a quantity required, when no process is known for arriving at it exactly. Although, by such an approximation, the exact value of a quantity cannot be discovered, yet, in practice, it may be found sufficiently correct; thus the diagonal of a square, whose sides are represented by unity, is $\sqrt{2}$, the exact value of which quantity cannot be obtained; but its approximate value may be substituted in the nicest calculations. This process is the basis of many calculations in pure and applied mathematics, and is of frequent use and great importance in all practical operations.

APPULEIUS. See APULEIUS.

APRICOT (*Prunus Armeniaca*) is a fruit of the plum tribe, which was introduced into Europe from Asia more than three centuries before Christ, and into England in the first half of the sixteenth century. Its specific name is due to the belief that it is a native of Armenia. But this opinion has been controverted by M. Regnier, a French naturalist, who asserts that it has not been found wild either in that district or in any of the neighbouring provinces, and states his belief that it is a native of Africa. It flourishes in such abundance in the African oases that the fruit is dried, and in this state forms an article of commerce. The apricot is a low tree, of rather crooked growth, with subcordate leaves and sessile flowers. The fruit is round, about the size of the peach, and resembling it in delicacy of flavour. Some consider the apricot the most delicate of all our hardy fruits. It is used for tarts, both green and ripe; it is also preserved with sugar in both these states, and is sometimes dried as a sweatmeat. Care should be taken to gather it before it becomes soft and mealy. The kernels of apricots have a pleasantly bitter flavour, and answer much better for several purposes in confectionery than bitter almonds, which are commonly used. They likewise contain a sweet oil, which, like that of almonds, was formerly used in emulsions. The gum that issues from the apricot-tree is similar to that of the cherry. The wood is coarsely grained and soft, and is consequently of little value. Apricot-trees are chiefly raised against walls, and are propagated by budding and occasionally by grafting. There are a great many varieties of apricot.

APRIES (Egyptian, *Wah-pra-hut*, 'the sun enlarges his heart', the *Pharaoh-hophra* of Scripture), the eighth king of the twenty-sixth or Saïte Egyptian dynasty. He succeeded his father Psamuthius in 590 or 588 B.C. His reign was at first highly prosperous; he appears to have defeated the allied fleets of Cyprus and Phœnicia. The Jews under Zedekiah revolted against their Babylonian oppressors and allied themselves with Apries, who drove the Babylonians back, but was unable to raise the siege of Jerusalem, which was taken by Nebuchadnezzar. Some time later Apries formed an alliance with the Libyans, and attacked the Greek settlement of Cyrene. He was, however, defeated, and his army, believing that they had been sacrificed to their master's ambition, mutinied on its return to Egypt. He sent Amasis, one of his best captains, to the disaffected army. The army saluted Amasis as king, and he consented to put himself at its head. The revolt soon spread, and Apries, at the head of his Greek mercenaries, marched against Amasis, but was defeated at Momemphis, taken prisoner, and in the end was strangled to appease the clamours of the nation, and buried at Sais, his capital, about 570 B.C.

APRIL, the name of one of the months, derived possibly from the Latin *aperire*, to open, because the buds open at this time. It was called by the Anglo-Saxons *Easter month*. The strange custom of observing *April fools' day* prevails throughout Europe. It can be traced farther back in France than either in England or in Germany. One of the explanations of the custom is as follows:—In the middle ages scenes from biblical history were often represented by way of diversion without any feeling of impropriety. The scene in the life of Jesus, where he is sent from Pilate to Herod, and back again from Herod to Pilate, was represented in April, and may have given occasion to the custom of sending on fruitless errands and other tricks practised at this season. The phrase of 'sending a man from Pilate to Herod' is common in Germany to signify sending about unnecessarily. The reason of choosing the first of April for the exhibition of this scene was that the feast of Easter frequently falls in this month, and the events connected with this period of the life of Jesus would naturally afford subjects for the spectacles of the season. The tricks of the first of April may, however, be the remains of some Roman custom derived from the East, and spread over Europe, like so many other customs, by these conquerors. Similar tricks are practised by the Hindus at the Huli festival, terminating on the 31st of March, In France the unlucky party who may be fooled is called *un poisson d'Avril*, that is, 'an April fish'. In Scotland he is called a *gowk*, which is Scotch for a cuckoo and a fool.

A PRIORI, the opposite of *a posteriori*. To judge or prove anything *a priori* means to do it on grounds or reasons preceding actual experience, or independent of it. Mathematical proofs, for example, are *a priori*. On the contrary, judgments or proofs *a posteriori* are founded on knowledge before acquired, like the conclusions of natural history and all experimental science. In ordinary speech a thing is said to be proved *a priori* when it is deductively derived from a more general principle, even though that principle may itself be derived from experience. This, however, is not the sense which the phrase bears in philosophy, and especially in the Kantian philosophy, in which it has an important part to play. By *a priori* knowledge Kant means not knowledge independent of this or that experience, but independent of all experience, such as, to use one of his own illustrations, the knowledge of the fact that space has three, and no more than three, dimensions. The marks of *a priori* knowledge, according to that philosopher, are, first, that it is necessarily true, and second, that it is absolutely universal, in the logical sense—that is, true of the whole subject; as in the example just given, it is the case that space not only has, but must have, three dimensions, and can have no more; and this is true of all space, and not merely of some spaces. See KANT.

APRON, in wooden ships, a piece of curved timber fixed behind the lower part of the stem, immediately above the foremost end of the keel. It receives the fastenings of the planking of the bow.

APSE, a well-marked projecting portion of a building, semicircular or polygonal in plan, roofed in by itself, and most commonly appearing as the eastern termination of the nave of a church. The apse is of Roman origin, corresponding to the curved recess in which sat the presiding magistrate and his assessors in the basilica or hall of justice. In front of the apse stood an altar for public sacrifices. When the Christians received the protection of the state in the time

of Constantine these buildings were made use of by them for their assemblies, the bishops occupying the seats originally appropriated to the presiding magistrates, and the inferior clergy filling the seats of the assessors, the altar still keeping its place. In the cathedrals of France, Germany, and Italy the apsidal termination is frequently met with; in England it is not so very common, but examples are found in Westminster Abbey, and the cathedrals of Canterbury, Rochester, Norwich, and Peterborough, and several parish churches; examples may also be seen in Scotland in the churches of Kirkliston and Dalmeny in Linlithgowshire and of Leuchars in Fifeshire.

APSIDES, two points in the orbit of one of the heavenly bodies, one at the longest the other at the shortest distance from the body round which the orbit is described. The orbits of the planets and comets are ellipses, in one of the foci of which is the sun. In the same way the satellites move round their planets. The nearest point of the ellipse from that focus occupied by the sun or other centre of revolution is called the lower apsis, or, in the orbits of the planets and comets, *perihelion;* the farthest point is called the higher apsis, or *aphelion.* In the orbit of our moon the corresponding terms to perihelion and aphelion are *perigee* and *apogee.* The straight line which joins the apsides, or the transverse axis of the ellipse, is called the *line of the apsides.* It moves slowly forward in the direction of the planet's course. Therefore, if the earth sets out from aphelion it must make more than a whole revolution in its orbit before it returns to the same point. The time which it employs in so doing is called an *anomalistic year.* See ANOMALY and YEAR.

APT (anciently *Apta Julia*), a town of France, in the department of Vaucluse, 32 miles east by south of Avignon. It stands on the left bank of the Calavon, in a fruitful and beautiful valley. The river is spanned by a remarkable Roman bridge, which stands almost unscathed by the floods and storms of nineteen centuries. The most remarkable building is the ancient Gothic cathedral. There are manufactures of wax tapers, confectionery, pottery, hats, and silk yarn. There is a considerable trade in corn, cattle, truffles, and southern fruits. Pop. 5000.

APTERA (Greek *a*, not, and *pteron*, wing), an entomological classification devised by Linnæus, under which he included all insects destitute of wings. As this characteristic, however, is applicable to insects of the most diverse forms and habits, the term, as distinctive of an order, has in recent times become almost exploded in scientific nomenclature.

APULEIUS, or APPULEIUS, author of the celebrated satirical romance called the Golden Ass, was born at Madaura, in Numidia, in the early part of the second century A.D.; the time of his death is unknown. He first studied at Carthage, then renowned as a school of literature, and afterwards went to Athens, where he became warmly attached, in particular, to the Platonic philosophy. To satisfy his thirst for knowledge he performed extensive journeys, in which he was initiated into various mysteries. On a journey which he intended to extend to Alexandria he fell ill, and was hospitably received in the house of Sicineus Pontianus, a former fellow-student, whose widowed mother Apuleius married. Soon after Pontianus died, and the relatives of the rich widow publicly accused Apuleius of having used magical arts to gain her love. The speech by which he successfully defended himself (Apologia sive Oratio de Magia) is still extant. The remainder of his life, which he devoted to oratory and literature, seems to have been passed at Carthage, where, as in some other cities, a statue was erected in his honour. Apuleius was of an ardent and active spirit, with an uncommon share of wit, though much devoted to religious mysticism and magic. His Golden Ass, a romance in eleven books, contains wit, humour, powerful satire, and much poetical merit. It is supposed to have been intended as a satire on the hypocrisy and debauchery of certain orders of priests, on the tricks of pretenders to supernatural powers, and on the prevalent vices generally. The finest part of this work is the episode of Psyche, called by Herder the most tender and many-sided of all romances. It is sufficient to render him immortal, even if he be, as some have supposed, only the narrator, and not the inventor of the story. Apuleius was also the author of many works on philosophy and rhetoric, some of which are still extant. Cervantes, Le Sage, and Boccaccio are among the modern authors indebted to Apuleius for various episodes, chiefly of a humorous character. An excellent edition of his whole works is that of G. F. Hildebrand (Leipzig, 1842). An English translation by Sir G. Head was published in Bohn's Classical Library in 1851.

APULIA, a department (*compartimento territoriale*) in the south-east of Italy, composed of the provinces of Foggia, Bari, and Lecce; area, 7376 square miles; pop., 2,100,000. The northern part forms the Apulian Plain, a rather barren tract on the whole, although affording extensive sheep pastures and isolated spots capable of cultivation, on which wine, olives, southern fruits, and maize are grown. The surface of the plain is not quite level, but is diversified by broad undulations crossing one another at right angles. The southern portion is traversed from west to east by low ranges of hills. In the extreme north-east of this part of the department rises close to the sea the isolated mountain Gargano, which in the peak of Calvo attains the height of nearly 5000 feet. The most important river is the Ofanto (Aufidus). There are four coast-lakes of considerable size. Lake Salsi, on the Gulf of Manfredonia, dries up in great part in summer; and on its banks are the great salt-boiling works of Barletta. There is a considerable trade in grain, oil, salt, southern fruits, cattle, wool, &c. Apulia was in ancient times inhabited by several peoples, such as the Apuli, Messapii, and Daunii. It was subdued by the Romans in 317 B.C. After the fall of the Western Empire Apulia came under the rule of the Ostrogoths, and afterwards under that of the Eastern Empire. Shortly after the middle of the sixth century A.D. the northern portion became part of the Lombard duchy of Benevento. The Byzantines afterwards recovered part of the territory thus lost, but in the eleventh century had to contend with the Normans for the possession of the whole, and in this struggle were ultimately worsted. In 1059 Robert Guiscard was recognized by Pope Nicholas II. as Duke of Apulia and Calabria. He was succeeded in 1085 by his son Roger, and he again by his son William, who died without heirs in 1127. Apulia was then seized by Roger II. of Sicily. See SICILIES (KINGDOM OF THE TWO).

APURE, a river in Venezuela, formed by the junction of several streams which issue from the Sierra de Merida, a part of the eastern chain of the Andes of New Granada, and after an eastern course of about 300 miles falls into the Orinoco at Capuchino. Almost its whole course is navigable.

APURIMAC, a river in South America, which rises from a lake in the Andes of Peru, in the province of Arequipa, not far from Caylloma. It flows through a mountainous country in a northerly direction, and joining the Yucay or Vilcamayu at lat. 9° 15′ S.; lon. 72° 30′ W., forms the Ucayale, one of the principal tributaries of the Amazon. Its whole course is between 500 and 600 miles.

AQUA FORTIS, another name of nitric acid. See NITROGEN.

AQUA MARINA, a fine variety of beryl.

AQUAMBOE, once an important kingdom on the coast of Guinea in Africa, now part of Dahomey.

AQUA REGIA, another name for nitromuriatic or nitrohydrochloric acid. See NITROGEN.

AQUARIANS, the name given to Christians in the primitive church, who consecrated water instead of wine for the celebration of the Lord's Supper—some for the sake of abstinence, others because they thought it unlawful to eat flesh or drink wine.

AQUARIUM, a name given to any place arranged so as to preserve living specimens of marine and fresh-water animals for the purposes of exhibition. An animal placed in water poisons it by inhaling oxygen and exhaling carbonic acid gas, and hence, if not relieved by supplies of new water, soon dies. To enable the animal to live without changing the water, it would be necessary to devise some method by which the oxygen absorbed in respiration might be restored, and the carbonic acid generated might be carried off. Such a method, as simple in its nature as it is successful in its application, has been furnished by the discoveries of modern chemistry. Animals consume oxygen and exhale carbonic acid; plants reverse the process by absorbing carbonic acid and giving out oxygen. Let water, then, be made their common habitation, and by means of the nicely-balanced system so wonderfully established the lives of both will be preserved. In pursuance of this idea tanks with plate-glass sides have been made use of, which are either filled with fresh or salt water, and are occupied by the aquatic plants and animals suitable to each. Though the theory is perfectly correct it has been found in practice that some molluscs must always form part of the stock of the aquarium, inasmuch as these consume the products of the decay which is liable to take place in the plants and would render the water impure. Care must also be taken that there are not too many animals in the aquarium for the number of plants. It is advisable to aerate the water frequently by taking up quantities of it in a spoon or other utensil and letting them fall again into the aquarium from a small height. In this way the amount of oxygen in the water is increased and the water rendered fitter for the use of the animals in it. The simplest form of aquarium is that of a glass vase; but aquariums on a larger scale consist of a tank or a number of tanks with plate-glass sides and stone floors, and contain sand and gravel, rocks, sea-weeds, &c. The plants most commonly grown in fresh-water aquariums are such as the *Vallisneria spiralis, Anacharis alsinastrum, Ranunculus aquatilis, Stratiotes aloides, Callitriche autumnalis*, species of *Chara*, &c. The animals may consist of sticklebacks, minnows, gold-fish, fresh-water molluscs—such as species of *Limnæa* and *Planorbis*—newts, frogs, &c. The rage for keeping aquariums in private houses has considerably cooled down since it has been pointed out by physicians that the moisture arising from the water may, especially in bed-rooms, give rise to intermittent fevers. The sea-water aquarium is much more interesting than the fresh-water aquarium, the flora and fauna of the sea being far richer both in form and colour than those of our ponds and streams. On a small scale, however, sea-water aquariums can only be kept at the coast where water plants and animals can be renewed whenever it is considered necessary; but on a large scale such aquariums have been constructed, and are kept up at very considerable distances from the sea, and have become highly popular as places of instruction and amusement. The first experiment of this kind was made at the Zoological Gardens in Regent's Park, London, where a large marine aquarium was opened in 1853. This proving a success numerous similar establishments have since arisen, among which may be mentioned those of Hamburg, Berlin, Brussels, Paris, Havre, Liége, and Brighton. In many cases the aquarium is so constructed that the only light that reaches the spectators passes first through the tanks in which the animals are kept. In this way an excellent view of the animals is obtained, while they are as little as possible disturbed by the onlookers, the latter standing almost in darkness. In some cases zoological stations, as they are called, are connected with the aquariums, for the purpose of enabling naturalists to study the animals in their zoological and physiological connections. A portion of the aquarium at Naples is specially set apart for this purpose. In these aquariums it may with truth be said that all kinds of marine animals and plants are kept, so that a very complete picture of marine life, both animal and vegetable, is obtained. The water is either brought from the sea or prepared artificially by mixing in proper proportions the elements contained in sea-water. The same water may be kept without renewal for an indefinite time, that in the aquarium of Hamburg not having been changed for thirteen years. To maintain its purity, however, it must be kept perpetually in motion, this being done by engine power. One of the largest marine aquariums is the Brighton Aquarium, the tanks of which are capable of containing altogether 500,000 gallons of water. The aquarium at Plymouth has importance as connected with a zoological station.

AQUATINTA, a method of engraving or etching upon copper or steel, which produces a good imitation of the style of an Indian ink or sepia drawing. There are several varieties of this method, but as the results are much alike in all, the principal differences lying in the modes of operating, we shall only notice that which was first invented, and is now practised chiefly by French and German artists. The outline of the subject having been etched and bit (see article ENGRAVING), the plate is thoroughly cleansed, and a thin layer of etching ground is again spread over it. When dry, the parts of the subject to be aquatinted are carefully painted over with a mixture of olive-oil, turpentine, and lamp-black; this fluid, laid on with a hair-pencil, quickly dissolves the parts of the ground it covers, which are then wiped smartly off with a clean rag. The plate is next dusted all over with a finely powdered white resin or mastic, and when equally distributed the superfluous resin is shaken off, and the plate gently heated over a charcoal fire till the resin dissolves and adheres to the bare metal. In dissolving, the grains of the resin run into small granules, leaving minute and peculiarly shaped portions of the metal open to the action of the aquafortis, a weak solution of which is then poured over the plate. When corroded to the proper strength the subject has got what may be termed the first wash of colour. The plate is then cleaned, recovered with ground, and treated as before, for the second tint. The process is repeated until all the deeper tones of shading are completed. These operations are sometimes reversed, the darkest shades being first bit in, and the lighter ones added by degrees. The chief difficulty in the process just described—that of stopping out round the smaller touches with sufficient precision—is overcome by an ingenious method of laying on the touches instead of stopping them out. The plate is covered with an aquatint ground, and a mixture of fine whiting and treacle, slightly thinned with water to make it work freely, is laid on the touches to be bit, by a hair-pencil in the same manner as in water-colour drawing. When the mixture is dry the entire plate is covered

with a thin varnish of turpentine and asphaltum, which rapidly hardens; the aquafortis is then poured on, and the parts previously covered with the treacle mixture break up and expose the touches to the action of the aquafortis. Aquatint plates are finished by rounding and softening the edges of the tints by the scraper and burnisher. For technical details of the different manners of aquatinting, see Green's Complete Aquatinter.

AQUA TOFANA, also called *Acquetta di Napoli, di Perugia*, or *della Toffa*, a poisonous liquid, which excited extraordinary attention at Naples at the end of the seventeenth and beginning of the eighteenth centuries, the history of which, however, is obscure. Tofana, or Toffania, a Sicilian woman, seems to have invented it. According to Lobat, after she had murdered many hundred men, she was strangled, although on the discovery of her guilt she fled to a convent. The liquid is described as transparent and tasteless, five or six drops being fatal, producing death slowly, and without pain, inflammation, convulsions, or fever. Gradual decay of strength, disgust of life, want of appetite, and constant thirst were the effects, which soon changed to consumption. A solution of crystallized arsenic seems to have been the chief ingredient, to which was added some *aqua cymbalariæ*. According to Ozanam, who has made the most recent investigations concerning this poison in Italy, a solution of sugar of lead in a liquid obtained by the distillation of cantharides with water and alcohol also bore the name of *aqua Tofana*. The *Eau admirable* of Madame Brinvilliers seems to have been little if at all different from *aqua Tofana*.

AQUA VITÆ ('water of life') is a name familiarly applied to native distilled spirits. It answers to the whisky (*usquebaugh*) of the Scotch and Irish, and the *eau de vie* of the French.

AQUEDUCT (Latin, *aquæductus*), an artificial channel or conduit for the conveyance of water down an incline for the supply of cities or to be used in some other way at its destination. Works of this sort for purposes of irrigation were made on a very extensive scale by the ancient Egyptians and Babylonians. Some of the aqueducts of the Greeks, which are used to this day, as at Athens and Syracuse, have been described as exhibiting a marvellous degree of enterprise and skill. The aqueducts of the Greeks are almost entirely subterranean, and are accordingly by no means conspicuous monuments of engineering art, which has caused them till recent times to be entirely overlooked. Even the ancient Romans thought that the Greeks had achieved nothing of moment in this direction. Some of the immense aqueducts of the Romans are still in use; some, in the state of ruins, are among the greatest ornaments of Italy. The consul Sextus Julius Frontinus, who, under the Emperor Nerva, had the direction of the aqueducts (96–98 A.D.), wrote a treatise on this subject—De Aquæductibus Urbis Romæ—and is of opinion that they are the most distinguishing proofs of the grandeur of the empire. He mentions nine city aqueducts, which had 1594 pipes of 1 inch and upwards in diameter. Aqueducts were either formed by erecting one or several rows of arcades across a valley, and making these arcades support one or more level canals, or by piercing through mountains which would have interrupted the water-course. When the aqueduct was conveyed under the ground there were openings at about every 240 feet. Some of the Roman aqueducts brought water from the distance of upwards of 60 miles through rocks and mountains and over valleys in places more than 190 feet high. The censor Appius Claudius Crassus Cæcus, the builder of the great road which was called after him, caused the first aqueduct to be built at Rome, the *Appia aqua*. Frontinus, as stated above, mentions nine, Procopius (550) fourteen, and the work ascribed to P. Victor twenty-four aqueducts, some of which were one, some two, some even three stories high, and many miles long. In almost all countries where the Romans extended their conquests aqueducts were built; thus we find the remains of them in France, Spain, and Asia. The principal ancient Roman aqueducts now remaining are the *Acqua Vergine*, repaired by Pope Paul IV.; the *Acqua Paola*, the ancient *Aqua Trajana*, restored by Paul V.; and the *Acqua Marzia*, restored at a quite recent date. One of the most magnificent works of this kind that have come down to us from the Romans is the aqueduct of Segovia, which consists of an arcade of 159 arches, for great part of its length double—that is, composed of two series of arches, one above the other—and wholly built of enormous stones joined without mortar. Another interesting aqueduct belonging to the later times of the Roman Empire, is the aqueduct of Pyrgos near Constantinople, which still assists in conveying a portion of the water supply to that city. This aqueduct consists of two branches at right angles to each other, and belongs to a complicated series of aqueducts and reservoirs. The extensive application of metal pipes has rendered the construction of aqueducts of the old type unnecessary; but what may be called aqueduct bridges are still frequently constructed in connection with waterworks for the supply of towns, and where canals exist canal aqueducts are common, since the water in a canal must be kept on a perfect level. Such aqueducts for carrying the waters of canals were introduced into England by the Duke of Bridgewater under Brindley's direction, the first and largest being the aqueduct at Barton Bridge for conveying the Bridgewater Canal across the Irwell. Numerous canal aqueducts have been constructed since then, but few or none since the development of the railway system. One of the most celebrated canal aqueducts is that called the Pont Cysylte in North Wales, which was constructed by Telford, and conveys the waters of the Ellesmere Canal across the Dee and the vale of Llangollen. The channel for the water is made of cast-iron, and is supported on cast-iron ribs which rest on pillars of stone. The length of the aqueduct is about 1000 feet. The aqueduct of Chirk on the same canal was the first in which any iron was employed. The aqueduct of Slateford near Edinburgh, conveying the waters of the Edinburgh and Glasgow Union Canal across the valley of the Water of Leith, has a channel composed entirely of cast-iron built in with masonry. It is 500 feet long, and the height of the canal above the river is 70 feet. Among modern aqueducts belonging to the European continent there are a number built in connection with the Marseilles waterworks, which convey the waters of the Durance to that city—a distance of about 60 miles. Among the other remarkable structures of this kind of recent date is the aqueduct of the Ganges Canal (which see). There are many other aqueducts which might be described, but our limits preclude our enlarging upon them, and it is the less necessary, as, excepting the formation of the water-way, these structures differ nothing in their design or the principle of their construction from ordinary bridges. See BRIDGE.

AQUEOUS HUMOUR. See EYE.

AQUEOUS ROCKS, rocks and deposits of earthy matter which owe their existence in their present form to the action of water, including under the term water glaciers and icebergs. See GEOLOGY.

AQUIFOLIACEÆ, the holly family, a natural order of plants, composed of shrubs with alternate

or opposite persistent leaves, of thick texture and smooth surface, with a toothed margin, the teeth being sometimes spinous. The flowers are solitary, or variously grouped in the axillæ of the leaves. Each of them has a calyx with from four to six small imbricated sepals, and a monopetalous corolla of an equal number of divisions alternate with the sepals united at the base. The stamens are inserted at the base of the corolla, and are alternate with its lobes. The stigma is generally sessile and lobed. The ovary is free, thick, truncate, with from two to six cells, each containing a single ovule suspended from the summit of the cell. The fruit is always fleshy, containing from two to six indehiscent woody or fibrous nucules or minute nuts inclosing single seeds. Among the genera are *Ilex, Cassine, Myginda.* The leaves of a species of *Ilex* afford the famous Paraguay tea. But one member of this order is found in Europe, the common holly (*Ilex Aquifolium*). The other members are found sparingly scattered over different parts of the world, especially the West Indies, South America, and the Cape of Good Hope. The Latin Ilex, the holm-oak, the scientific name of which is *Quercus Ilex*, belongs to a different natural order from the holly, to the same order as the oak (Corylaceæ).

AQUILA, a town in Italy, capital of the province of Abruzzo Ulteriore II. (Aquila), picturesquely situated in the neighbourhood of the highest summits of the Apennines, 55 miles north-east of Rome. It is the seat of a bishop, and has a lyceum, a provincial agricultural institute, a technical school, and some manufactures. Saffron is grown in the surrounding district. In the neighbourhood, at San Vittorino, are the ruins of the ancient Amiternum, the birthplace of Sallust. In 1703 it suffered most severely by an earthquake. Pop. (1901), 21,188.

AQUILARIA, the name given by Lamarck to a genus of trees belonging to the south of Asia and the East Indies, and by R. Brown constituted, along with the two genera *Ophiospermum* and *Gyrinops*, into the natural order Aquilariaceæ, to which some other genera have since been referred. The leaves are alternate, entire, without stipules, and when full grown are smooth and shiny; the calyx is five-cleft, the stamens five or ten in number, ovary superior, one-celled, but with the appearance of having two cells. Aloes wood (which see) is the inner portion of the trunk of the *Aquilaria ovata* and *Aquilaria Agallochum.*

AQUILEIA, in the time of the Roman emperors a flourishing commercial city near the head of the Adriatic Sea, in Upper Italy. It was built by the Romans, who, in 182 or 181 B.C., established here a colony of 3000, to serve as a barrier against the irruptions of the barbarians. From its position it soon gained both political and commercial importance, and at the time of its greatest prosperity it contained more than 100,000 inhabitants. It was the key of Italy on the north; it was strongly fortified, and on account of its wealth was sometimes called the *second Rome.* In 238 A.D. it shut its gates against Maximin, by whom it was besieged till the tyrant was slain by his own soldiers beneath its walls. In 452 it was destroyed by Attila. Some of the inhabitants fled to the islands on which Venice was afterwards built. In place of the old Aquileia there rose in course of time a new town which suffered considerably at the hands of the Goths and the Lombards in the fifth and sixth centuries. The modern Aquileia or Aglar is a small place of some 1700 inhabitants, consisting chiefly of fishermen. It contains a large cathedral built about 1040; and numerous remains of antiquity (including a floor with a representation in mosaic of the rape of Proserpine) have been found on the site.

AQUINAS, ST. THOMAS, a celebrated scholastic divine, descended from the counts of Aquino in what was then the Kingdom of the Two Sicilies, and related by birth to several of the royal families of Europe, was born between the years 1224 and 1227. He acquired the rudiments of education at the Benedictine monastery of Monte Casino, and was thence removed to the University of Naples, where he studied for six years. About the age of seventeen he entered a convent of Dominicans, much against the wishes of his family, and especially of his mother. Partly to evade the endeavours of his family to recover him, and partly on account of the extraordinary aptitude he displayed for theological studies, his superiors sent him to Cologne to hear the lectures of the famous Albertus Magnus. At Cologne he was so remarkable for taciturnity, and the assiduity and apparent stolidity with which he pursued his studies, that he was known among his fellow-students as 'the great dumb ox of Sicily.' His teacher, however, discerned his abilities, and is said to have foretold that 'this ox would one day fill the world with his bellowings.' In 1245 or 1246 he visited Paris in company with Albertus. About this time he became involved in the dispute between the university and the Begging Friars as to the liberty of teaching. He advocated the rights claimed by the latter with great energy, and being called upon to defend his side in this controversy before the pope, he did so with complete success. In 1248 he returned with Albertus to Cologne, and he does not seem to have revisited Paris till 1257, when he received the degree of doctor from the Sorbonne, and began to lecture on theology, rapidly acquiring the highest reputation. Princes and popes held him in the greatest estimation, and he was invited by St. Louis, who was a relative of his, to his court and table. The remainder of the life of Aquinas was one of the most varied activity. When stationary at any place he was almost constantly engaged in lecturing and preaching, but he was often sent on distant journeys in the service of his order. In 1263 he is found at the Chapter of the Dominicans in London. In 1268 he was in Italy, lecturing in Rome, Bologna, and elsewhere. In 1271 he was again in Paris lecturing to the students; in 1272 professor at Naples. In 1263 he had been offered the archbishopric of Naples by Clement IV., but refused the offer. A general council being summoned at Lyons in 1274, for the purpose of uniting the Greek and Latin Churches, Aquinas was called thither to present the council with a book which he had written on the subject, but died on the way, at Tossanuova, near Terracina. After his death the honours paid to his memory were prodigious: besides the title of *angelic doctor*, bestowed on him after the fashion of the times, he was called the *angel of the schools*, the *eagle of divines*, and the *fifth doctor of the church;* in 1286 he was made by the Dominicans the doctor of their order (*doctor ordinis*); at the request of the Dominicans he was, in 1323, canonized by John XXII., his tomb supplying the necessary testimony of miracles; and in 1567 he was declared by Pius V. the 'Fifth Doctor of the Church.' The numerous works of Aquinas are all written in Latin. The most important of them is the Summa Theologiæ, which, although only professing to treat of theology, is in reality designed to form a complete and systematic summary of the knowledge of the time. As all things proceed from God, every branch of knowledge was regarded by Aquinas and the schoolmen generally, of whom Aquinas is the typical representative, as part of the knowledge of God, and therefore as belonging to theology. All the minor works of Aquinas may be looked upon as preparatory to this great one. These are a commentary on the Sentences of Peter of Lom-

bardy (In quatuor Sententiarum Petri Lombardi Libros); a treatise on unsettled points in theology (Quodlibeta disputata et Quæstiones disputatæ); the Catena Aurea or Golden Chain, in form a commentary on the four Gospels, but in substance an exhaustive exposition of the cardinal doctrines in theology of the greatest fathers of the church; and commentaries upon Isaiah and Jeremiah, the Epistles of St. John the Divine, and the Psalms, as well as upon Aristotle's De Interpretatione, Posterior Analytics, Metaphysics, Physics, and De Anima. His works were published at Rome in 1570–71 in seventeen vols., and several times afterwards (as at Venice, 1765–88, twenty-eight vols. 4to); but his Summa Theologiæ has passed separately through various editions. The resemblance in thinking and writing between Augustin and Aquinas is so marked, that it has been fancifully said that the soul of the one had passed into the body of the other. The disciples of Aquinas, among the chief of whom are Ægidius of Colonna (1247–1316), Hervæus Natalis (died 1323), and Thomas Bradwardine (died 1349), are called after him *Thomists*. See Werner Der heilige Thomas (Ratisbon, 3 vols. 1858); Gibelli Vita de S. Tomaso (Bologna, 1862); and Dr. R. B. Vaughan's St. Thomas of Aquino, his Life and Labours (London, 1872).

AQUITANIA, the name of a Roman province in Gaul, which comprehended the countries on the coast from the Garonne to the Pyrenees, and from the sea to Toulouse. Augustus extended it to the Loire. The inhabitants of Aquitania (Aquitani) were probably Iberians driven towards the west by the incursions of the Celts. They were actively engaged in commerce. Aquitania was conquered by the West Goths about 412; from them it passed to the Franks in 507. Since that time it has been sometimes a kingdom, sometimes a duchy; and more recently it passed under the name of *Guienne*. See FRANCE—History, and GUIENNE.

ARABELLA STUART, commonly called the *Lady Arabella*. This unhappy and innocent victim of jealousy and state policy was the only child of Charles Stuart, earl of Lennox, younger brother to Henry Lord Darnley, the husband of Mary Queen of Scots. She was therefore cousin-german to James I., to whom, previously to his having issue, she was next in the line of succession to the crown of England, being the great-great-grand-daughter of Henry VII., whose daughter Margaret, having been first married to James IV. of Scotland, became by a second marriage the mother of Margaret Douglas, mother of Darnley, and Charles Stuart, earl of Lennox. She received an excellent education. Her proximity to the throne was the source of her misfortunes. Elizabeth, for some time before her decease, held the Lady Arabella under restraint, and refused the request of the King of Scotland to give her in marriage to the Duke of Lennox, his kinsman, with a view to remove her from England. The pope had likewise formed the design of raising her to the English throne, by espousing her to the Duke of Savoy; which project is said to have been listened to by Henry IV. of France, from a wish to prevent the union of England and Scotland. The detection of a plot of some English nobles to set aside James in favour of Arabella Stuart, of which she was altogether innocent, ultimately proved her destruction; for although left at liberty for the present, when it was some time after (in 1610) discovered that she was secretly married to William Seymour, son of Lord Beauchamp and grandson of the Earl of Hertford, both husband and wife were placed in confinement, the husband being committed to the Tower. At the end of a year they both contrived to escape at the same time, but the unhappy lady was retaken. She was then herself committed to the Tower, the remainder of her life was spent in close confinement, which finally deprived her of her reason. She died on the 27th September, 1615, aged thirty-eight years. She possessed talents of a superior order, and a very pleasing person.

ARABESQUE, or MORESQUE, in painting or sculpture, is a term applied to a particular species of ornamental frieze or border, first introduced into Europe, as has been asserted, by the Moors, when they conquered Spain. This assertion, however, is not altogether well founded, since decorations of this kind have been found in the baths of Titus at Rome, in some of the ancient Roman mausoleums, particularly in that called the tomb of the Nasos, and in the painted chambers of Pompeii. It is, indeed, one of the oldest and most wide-spread forms of ornamentation. Nevertheless, this style of decoration is so conspicuous a feature in Moorish works that the Moors may rightly be credited with having reintroduced it into Europe. The followers of Mohammed being prohibited by the Koran from representing the figures of men and beasts, have endeavoured to evade this law by inventing a series of monsters, griffins, dragons, strange birds, and chimeras, passing by wild gradations from one class of beings into another; affixing the head, wings, and talons of birds to the bodies of lions, horses, and other quadrupeds; and making the upper parts of children, men, and beasts spring out from amidst luxuriant clusters of foliage, &c. This strange and incongruous admixture of parts is, however, capable of being formed into beautiful arrangements; and, in some of the chambers of the palace of the Vatican, there are ornamental paintings, executed by Giovanni da Udine from the drawings of Raphael, in this style, which are deservedly much admired. In the old Moorish palaces in Spain are superb specimens of this sort of ornament, as in the Alhambra at Grenada; and the cathedrals of Coria, Salamanca, Ciudad Rodrigo, Valladolid, &c., abound with it.

ARABGIR, ARABKIR, or ARABKEIL, a town in Asiatic Turkey, in the vilayet of Sivas, 147 miles W.S.W. of Erzeroom. Originally a small town with a fortress, it owed its enlargement and prosperity to the Armenians, who form about one-fourth of the population. It is especially noted for its manufacture of silk and cotton goods, and it also produces considerable quantities of fruit. Its population is about 20,000. The district around is rough and hilly, but intersected by well-watered valleys, inhabited by Turcomans.

ARABIA, the south-westernmost part of Asia, is called by the natives Jezíret el Arab, that is, the Peninsula of the Arabs; and by the Turks and Persians, Arabistan. Arabia is encompassed on three sides by the sea, namely, on the north-east by the Persian Gulf, on the south-east by the Indian Ocean, and on the south-west by the Red Sea. Its most southern point, Ras-Arah (the Cape St. Anthony of some maps), lies in lat. 12° 35′ N.; lon. 44° 4′ E. Thirty miles to the west of it are the Straits of Bab-el-Mandeb. The most eastern point of Arabia, Ras-el-Had, stands in lat. 22° 23′ N.; lon. 60° 5′ E. A line drawn from the head of the Gulf of Suez to that of the Persian Gulf, and marking the limits of the Arabian peninsula on the north, will be found to run nearly in the 30th parallel of north latitude, but a portion of what is considered Arabia extends north of this. Arabia includes also the Peninsula of Sinai, between the Gulf of Suez and that of Akabah. The whole area of the vast country thus described does not probably fall much short of 1,000,000 square miles, or about eight times that of the British Islands.

According to Ptolemy, ancient Arabia consisted

of Arabia Petræa, Arabia Deserta, and Arabia Felix, a division which has likewise been followed in modern times, but which is both founded on erroneous principles, and unwarranted by the example of the inhabitants of the country. The name of Arabia Felix, or Arabia the Happy, is derived from an incorrect translation of the word *Yemen*, which does not signify *happy*, but the country lying to the right of Mecca, in the same manner as the Arabic term for Syria, Al-Sham, denotes the country lying to the left of that city. Arabia Petræa likewise has been erroneously translated Stony Arabia, the epithet Petræa having been bestowed on it by Ptolemy, from the once flourishing city of Petra.

There is much discrepancy in the accounts of native writers respecting the modern territorial divisions of peninsular Arabia; and the limits of those divisions which they concur in establishing appear to have fluctuated much at different periods, if, indeed, they were ever ascertained with precision. The first of the divisions met with in proceeding down the Red Sea is Hejaz, which, as it includes the sacred cities Mecca and Medina, is always set forth conspicuously by Arab geographers. It extends a short way within the mountain barrier, and terminates in the south in about lat. 20° N. Next comes Yemen, which, according to some writers, embraces the whole of South Arabia; but the name is now generally used in a confined sense, Yemen proper occupying the south-western part of the peninsula, and comprising a Tehama or maritime lowland on the shores of the Red Sea, with an elevated inland district of considerable breadth. It contains the towns of Sana and Mocha. Appertaining to Yemen is Aden, now a free port in the hands of the British. Next Yemen, on the east, is Hadramaut, the western portion of which is a desert five days' journey in length. The limits of this province are, however, variously assigned by authors, some extending the name to almost the whole of the south-eastern coast, while others confine it to a district only 100 miles in length. Beyond Hadramaut, in the latter narrower sense, lies Mahrah, beyond which again extends the principality of Shejer or Shehr, at the eastern termination of which, near the coast, is the populous district of Dhofar, which has occasionally figured as an independent state. At the eastern angle of the peninsula is situated Oman. On the southern shores of the Persian Gulf is Bahrein, from which, towards the head of the gulf, extends the maritime district of Hajar, while at a short distance south-west in the interior lies the fertile district of El-Ahsa, the name of which is sometimes also given to the coast. The interior of Arabia, from Hejaz and Yemen across to the vicinity of the Persian Gulf, is comprised, by Arab geographers, under the single name of Nejed. Towards the north-west and north are the deserts of Sinai, and those of Sham, Jezíreh, and Irak (Syria, Mesopotamia, and Babylon). The two most populous districts are Yemen and Oman. The principal of these divisions will be found noticed in separate articles.

The knowledge which we possess of Arabia in detail is still extremely scanty. In general, however, it is marked by the characteristic attributes of Northern Africa. It is separated from the plateaus of South-east Syria by detached chains of barren rocks, whilst to the south of these plateaus of Southern Syria several mountain chains, among others the Charrah, surround, as it were like a fringe, the plains on the west coast, and by cross branches not only intersect the territory lying along the shores of the Red Sea, but likewise, in their eastern elevations, form the framework of the interior highlands. The most detached portions of the mountain system of Arabia occur respectively in the south-east and south-west of the peninsula, in the former of which, in Oman, the range of the Jebel Akhdar and the valley of the Masara form the same contrast with the uniform undulations of the great inland desert as the mountain territory of Yemen, in the latter, with the river Meidan, discharging itself into the Indian Ocean at Aden, does with the desert coast tract of Tehama. Arabia is said to attain its culminating point of 9000 feet of height in the inland district of Nejed.

The climate of Arabia resembles that of Africa. The mountains obstruct the mitigating influence of the sea-breeze; scorching aridity and barrenness characterize both high and low grounds, and the date-palm is often the only representative of vegetable existence. There are even districts which in the course of the year are refreshed by only one shower of rain, while a sky almost perpetually unclouded overspreads the sterile plains. The short rainy season, which, in consequence of the shifting winds prevailing in the Red Sea, visits the west coasts in our summer months, fills with water, but only periodically, the depressions in the surface or *wadis*, and a winter marked by slight frosts occurs in the table-lands of the interior and north-east. The simoom occasionally blows during the hot season, though only in the northern districts.

Arabia is destitute of large forests, and extensive plains of green turf have their place supplied by steppe-like tracts, which, however, covered with aromatic herbs, afford excellent pasture to noble breeds of horses. The terrace portions of the country, which enjoy a more temperate climate, exhibit a greater luxuriance of vegetation. Here the date palm, vine, fig, peach, banana, and other sorts of fruit flourish along with durra (a species of millet which is here generally cultivated instead of European corn), the finest coffee in the world (the staple commercial product of the country), and many aromatic plants and substances, such as gum-arabic, benzoin, mastic, balsam, aloes, myrrh, frankincense, &c. There are also cultivated in different parts of the peninsula, according to the nature of the soil and climate, beans, rice, lentils, tobacco, melons, saffron, colocynths, poppies, olives, the kâth bush (*Catha* or *Celastrus edulis*), the leaves of which are in general use, like those of the coca in Peru, as an excitant, sesame, the castor-oil plant, &c. In its fauna also, as corresponding with the desert nature of the country, Arabia presents much of an African type. Sheep, goats, and oxen supply man's immediate domestic and personal wants; the horse and camel are his faithful attendants on his wide peregrinations; asses and mules, of a stronger make and better appearance than those of Europe, are common in the mountainous districts; the desert is inhabited by gazelles and ostriches hurrying rapidly from oasis to oasis; and the lion, panther, hyena, and jackal crouch in ambush for the passing prey. Monkeys, pheasants, and doves are the peaceful occupants of the fertile districts, in which, however, locusts frequently commit tremendous havoc. There are several species of serpents and lizards, and scorpions and poisonous spiders are numerous. Fish and turtles abound on the coasts, and pearl-oysters in the Persian Gulf. Among mineral products may be mentioned saltpetre, mineral pitch, and petroleum, which are found in the interior highlands, salt, sulphur (in Hadramaut), and several precious stones, as the carnelian, agate, and onyx. Iron, copper, and lead are far from abundant, and the country is also poor in the precious metals.

The population of Arabia has been estimated by some at 12,000,000, by others at no more than 4,000,000. The former number is certainly too

high, and it is believed that between 5,000,000 and 6,000,000 is near the truth. The Arabs present, as a nation and as individuals, much that is peculiar both in their mental and physical development. They are of middle stature, of a powerful make, and have a skin of a brownish colour. Their features express dignity and pride; they are naturally active, intelligent, and courteous; and their character is marked by temperance, bravery, and hospitality, along with a strong propensity for poetry. On the other hand, they are revengeful in their disposition and predatory in their habits. The women have the entire education of the children in their early years. The most fortunate events in the estimation of an Arab are the birth of a camel, a mare of noble breed bringing forth a foal, or a triumph achieved by a poet. The first religion of the Arabs, the worship of the stars, was supplanted by the doctrines of Mohammedanism, which succeeded rapidly in establishing itself throughout Arabia. Besides the two principal sects of Islam, the Sunnites (the most numerous) and the Shiites (on the east coast), there also exists, in very considerable numbers, a third sect, the Wahabees, which arose in the latter half of the eighteenth century, and to which the Beduins of Nejed belong. (See MOHAMMED, SHIITES, SUNNITES, and WAHABEES.) There are also numerous Jews, who dwell among the Arabians, and are chiefly employed in trade.

The whole of the west coast, comprising the districts of Hejaz and Yemen, and in quite recent times part of the east coast, namely the Republic of Koweit at the head of the Persian Gulf, and the district of El Ahsa, are more or less under the suzerainty of the Turks. The area of the western strip is about 200,000 square miles in extent, and has a population of about 1,130,000; while the eastern strip has an area of about 31,000 square miles and a population of about 200,000. Even in these districts, however, the chief offices of government are performed by the chieftains of the small territories into which the districts are subdivided. The most extensive districts politically united in the rest of Arabia are the kingdoms of Oman and Nejed, the former with an area of 81,000 square miles, and a pop. of 1,598,000; the latter (the kingdom of the Wahabees) with an area of perhaps 200,000 square miles, and a pop. of about 1,219,000.

The mode of life of the Arabs is either nomadic or settled, or in other words, they either live in tents and derive their subsistence from the rearing of cattle, wherever sufficient pasture is obtainable, and from the transport of caravans through the desert; or from the pursuits of agriculture and commerce. The nomadic tribes of Arabia are termed Bedouins, Beduins, or Bedawins; those following settled occupations, Hadji and Fellahs. A considerable trade, partly overland partly maritime, is carried on, chiefly in coffee, dates, figs, spices, and aromatic substances of various kinds, though the present amount of traffic is scarcely a shadow of what it was in the times previous to the discovery of the passage by the Cape of Good Hope. Commerce is partly in the hands of foreigners, among whom the Jews and Banians are the most numerous. The latter are a tribe of Indian merchants, who, however, only remain long enough in the country to enable them to return with wealth to their own land. The trade is almost confined to exports of raw material and imports of foreign manufactures. The chief centres of commerce are Aden, Muscat, and Bahrein, where British shipping has far the largest share; Jidda and Hodeida are the principal Red Sea ports. Jidda is the chief port for pilgrims to Mecca; towards Mecca a railway runs from Damascus. The period of intellectual development among the Arabs is now indeed long past its zenith, but it does not appear yet to have sunk so low as is often assumed. Even in the desert children are taught to read, write, and cipher, and in the towns there are higher schools for satisfying the taste for scientific pursuits. The political constitution of the Arabs is patriarchal, and is based on a love of freedom. The titles of the chiefs of the tribes are Emir, Sheikh, or Imam, whose functions appear in general to be limited to the command of the army in war, the collection of tribute, and the administration of law by the cadis or judges.

The history of the Arabs previous to Mohammed is obscure, and owing to their slight connection with the rest of the world of little interest. The evidence of language, tradition, and other things establishes the fact that Arabia must have been settled at a very early date by two branches of one race. One of these branches inhabits the south and east of the peninsula (Yemen, Hadramaut, and Oman), and considers itself as forming the 'pure Arabs,' while to the other branch it gives the name of *Mostareb* or 'Arabified.' The oldest traditions regarding the origin of the former branch point to an immigration from Africa, which took place about the south-western corner of the peninsula, and the physical appearance and structure of the southern Arabs, the remnants of their dialect (which is now superseded by that of the northern branch), and various institutions and customs prevailing in the parts of Arabia inhabited by them, all confirm the notion that they were originally identical with the nearest inhabitants of Africa. The northern branch, on the other hand, although bearing an unmistakable affinity with the southern, shows (in its language and other respects) more traces of Asiatic than African influence.

The Arabs of the southern branch were the first to attain to any considerable political power. A kingdom belonging to this branch is said to have existed in the south for upwards of 2000 years, embracing when in a flourishing condition the whole of the southern half of the peninsula, and sometimes extending its boundaries by conquest very much further. There is no doubt that there actually was such a kingdom, called the Kingdom of Yemen, and having its capital first (it is said) at Mareb, and afterwards at Sana, both in the district of that name; but how long that kingdom subsisted cannot be determined. Its kings belonged to the Himyarite dynasty, but this designation Himyarite is sometimes applied by Arab writers to the ruling classes of the southern branch, and sometimes to the whole branch. The Yemenite kingdom was rendered subject by the Abyssinians for upwards of seventy years in the sixth century of the Christian era, during which period Christianity was proclaimed in the land. Ultimately the heir to the throne of the Himyarite dynasty was restored through the assistance of Chosroes, king of Persia (605 A.D.), but about thirty years later the kingdom was finally overthrown by the followers of Mohammed. Another Himyarite kingdom was that of Hira on the western shore of the Lower Euphrates. It seems also to have extended at times to the region between the Euphrates and the Tigris, so as to give the name of Irak Arabi to that district. The dates given for the foundation of this kingdom are widely different. Its overthrow is placed in the fifth century of our era. In the first century of the Christian era the Himyarite kingdom of Ghassan was founded in Lower Syria and Hejaz. It lasted till the time of Mohammed. The last Himyarite kingdom that need be mentioned is that of Kindeh, which detached itself from that of Hira early in the third century, and lasted about 160 years. Its sway extended over Northern Nejed. The divided forces of the Arabs

could not always successfully resist the Roman arms, and though their country was never completely reduced to the condition of a province, yet the princes in the north at least lived in a state of dependence on the Roman emperors, and were regarded as their viceroys. In the south the Romans had no influence. An expedition was fitted out against Yemen in the reign of Augustus (24 B.C.), but it completely miscarried. With the decline of the Roman Empire Arabia made vigorous struggles for independence, which could easily have been brought about by a union of the various tribes. But the Arabian peoples continued dispersed and broken, and passed many centuries in internal conflicts, during which the central highlands (Nejed) became the theatre of those chivalrous contests so celebrated by the native poets. Christianity early gained many adherents in Arabia, though it did not succeed in entirely banishing the ancient worship of the stars. Several Christian bishoprics were established, subject to the metropolitan at Bozra, in Palestine. The town of Elhira, near the Euphrates, contained many Arabian Christians and convents, and the reigning king, Ennomân-ben-el-mondsir, became a convert to Christianity not long before the time of Mohammed. The conflict of the Arabs with Roman despotism was more especially the cause of attracting to their country numbers of Christian sects, among others the Monophysites and Nestorians, who sought a refuge from the persecutions to which they were subjected by the maintainers of orthodoxy throughout the East. Jews also were very numerous in Arabia after the destruction of Jerusalem, and even made some proselytes, chiefly in Yemen. The wide differences between the various sects produced in the minds of many an indifference to all the existing religions, and was probably one of the principal causes that the doctrines of Mohammed found so speedy an acceptance in Arabia.

With Mohammed a new phase commences in the history of the Arabian peoples, who are wont to designate respectively the periods before and after the appearance of the prophet as those of ignorance and knowledge. Mohammed belonged to the Mostareb, and among them to the tribe of Koreysh, which had occupied a position of great influence in Arabia since the beginning of the fifth century, when it managed by craft to obtain possession of the city of Mecca, which was not only a city of great commercial importance, but was regarded as sacred by the Arabs on account of its containing the Kaaba. (See KAABA.) During the whole of the sixth century the Mostareb generally were increasing in power, and by the beginning of the seventh, when Mohammed had grown to manhood, they had absorbed the Kingdom of Kindeh, and had extended their sway at the expense of those of Yemen, Hira, and Ghassan. By the time of Mohammed's death, in 632, his religion had acquired a firm hold in Arabia, and after that event his successors, acting on the commands of the Koran, began to spread it by force of arms beyond the bounds of the peninsula. The nation, now for the first time acting as a body, played for several centuries an important part on the stage of the world's history, and advanced in a career of victory beyond its natural frontiers, to found empires in three quarters of the globe. (See MOHAMMED, CALIPH, and MOORS.) The brilliant period of Arabian history, indeed, as regards foreign countries, came to a termination in Asia in 1258, on the fall of the caliphate of Bagdad, as also about the same time in Africa and Europe, in the latter of which the Moorish dominion was finally overthrown (in the Kingdom of Granada in Spain) in the last decade of the fifteenth century; yet the epoch of the Arab sway must ever occupy a distinguished place in the intellectual history of mankind. (See below—*Language and Literature.*) The internal history of the country during its foreign conflicts presents little more than unimportant accounts of some Bedouin tribes, and the fortunes of the caravans which made the annual pilgrimage to Mecca. In 1517 Turkey subjected Hejaz and Yemen, and received the nominal submission of the tribes inhabiting the rest of Arabia. The subjection of Hejaz has continued down to the present day, with a brief interval in the latter half of the sixteenth century, and another longer interval in the present century, when the Pasha of Egypt was dominant in Arabia; but Yemen achieved its independence in 1630, and maintained it till 1871, when the territory again fell into the hands of the Turks. In 1839 Aden in Yemen was occupied by the British. In the east Oman became virtually independent of the caliphs in the middle of the eighth century, and grew into a well-organized kingdom. In 1507, however, its capital, Maskat or Muscat, was occupied by the Portuguese, who were not driven out till 1651. Oman was temporarily subjugated by the Persians under Nadir Shah in the first half of the eighteenth century. They were expelled by Saood, who was made Imam of Oman, and under whom it extended its sway over part of the opposite coast of Persia as well as the islands lying between, and over the coast of Zanzibar. Since 1867 the Kingdom of Oman has been again confined to the mainland of Arabia. The appearance of the Wahabees about the middle of the eighteenth century is the first event since the time of Mohammed that affected Arabia generally. (See WAHABEES.) The moral effects of this event exercise still a powerful influence; the political were soon effaced by the ruler of the neighbouring country of Egypt. Mehemet Ali, pasha of Egypt, subdued the coast of Hejaz, as also several places on that of Yemen, and in 1818, by means of a great victory gained by Ibrahim-Pasha, and the destruction of their capital city Derreyeh, put a stop to the further extension of the Wahabite power. He also expended large sums in the maintenance of his sway in Arabia, which secured to him the trade of the Red Sea. The events of 1840, however, in Syria, compelled him to concentrate his forces, and he soon found himself obliged, as thwarting the European line of policy, to renounce all claims to the territories lying beyond a line drawn from the Dead Sea to the Gulf of Akabah. The Hejaz thus again became immediately subject to Turkish sway. Turkey has since extended its rule not only over Yemen as already mentioned, but also over the district of El Ahsa on the Persian Gulf; but Yemen has latterly been in full revolt, and it seems doubtful if Turkey's tenure of power in Arabia will last much longer.

Among works on Arabia may be mentioned Forster's Historical Geography of Arabia (two vols. London, 1844); Niebuhr's Beschreibung von Arabien (Copenhagen, 1772); Burckhardt's Travels in Arabia (London, 1829); Count Laborde's splendid work, Voyage dans l'Arabie petrée (Paris, 1830); Burton's Pilgrimage to El-Medinah and Meccah (London, 1855), and his Gold Mines of Midian and Ruined Cities of North-west Arabia (1878); W. G Palgrave's Journey through Central and Eastern Arabia (London, 1865); Lady Anne Blunt's A Pilgrimage to Nejd, the Cradle of the Arab Race (London, 1879); J. F. Keane's My Journey to Medinah (London, 1881); C. M. Doughty's Travels in Arabia Deserta (1882–88), &c.

LANGUAGE AND LITERATURE. *Language.*—The Arabic language belongs to the Semitic dialects, among which it is distinguished for its richness, softness, and high degree of development. By the spread

of Islam it became the sole written language and the prevailing speech in all South-western Asia, and Eastern and Northern Africa, and for a time in Southern Spain, in Malta, and in Sicily; and it is still used as a learned and sacred language wherever Islam is spread among people who in daily life speak Indian, Persian, or other languages. The study of Arabic is important not only on account of the wide area over which it is still spoken and the extensive literature it contains, but also because it is almost an indispensable preliminary to the study of some of the other languages of the East. Almost a third part of the Persian vocabulary consists of Arabic words, and there is the same proportion of Arabic in Turkish. A scientific treatment of the Hebrew language first became possible through comparing it with the Arabic. The characters originally used in writing the Arabic language were borrowed from the old Syrian Estrangelo alphabet, which, however, was very inadequate for the purpose, having only sixteen signs for the twenty-eight Arabic consonants. This alphabet is now superseded by the Neski. As in all Semitic languages (except the Ethiopic) it is read from right to left. There are valuable Arabic grammars by Erpen (1613), De Sacy (1831), Ewald, Caspari, Wolff (second edition, 1867); and in English by Wright (based on that of Caspari but practically a new work, London, 1874–75), and Palmer (London, 1874). The great standard Arabic-English Dictionary is that of Ed. W. Lane (continued by his nephew, Mr. Lane Poole, a most extensive work, recently completed). Other valuable works are Richardson's Persian-Arabic-English Dictionary; Newman's Dictionary of Modern Arabic (1871); Badger's English-Arabic Dictionary (1881); and Salmoné's Arabic-English Dictionary (1890).

Literature.—Of the first cultivation of the literature of this country we have but few accounts. That poetry early flourished in Arabia may be inferred from the character of the inhabitants, who are at the present day much given to poetry. In the fairs of Mecca and (from the fifth century after Christ) at Okadh, poetical contests were held, and the poems to which the prize was awarded were written on byssus in letters of gold, whence they were called *Modsahhabât* (gilt), and hung up on the wall of the sacred temple containing the kaaba at Mecca, on which account they also got the name of *Moallakât* (hung up). The collection of the Moallakât contains seven poems by seven authors—Amr-ul-kais, Tarafa, Zohair, Lebid, Antar, Amr-ben-Kelthum, and Hareth. They are distinguished by deep feeling, lofty imagination, richness of imagery and sentiment, national pride and love of freedom. Many other poems belonging to the time before Mohammed, some of equal age with those of the Moallakât, are also preserved in collections. The influence of Mohammed gave a new direction to Arab poetry. The rules of faith and life which he laid down were collected by Abubekr, first caliph after his death, corrected and published by Othman, the third caliph, and constitute the Koran. The warlike times of Mohammed and the first caliphs, however, were not favourable to the cultivation of literature. The progress of the Arabs in the arts and sciences may be said to have begun with the government of the caliphs of the family of the Abassides, A.D. 750, at Bagdad. Here Haroun al Rashid (786–808) invited learned men from all countries and paid them princely salaries. He caused the works of the most famous Greek writers to be translated into Arabic and spread abroad by numerous copies. Under the government of Al Mamum (813–833) excellent schools were established at Bagdad, Bassora, Bokhara, Cufa, and large libraries at Alexandria, Bagdad, and Cairo. The Caliph Motassem, who died A.D. 842, was of the same disposition, and while literature was thus favoured by the dynasty of the Abassides in Bagdad it received not less encouragement from that of the Ommiades in Spain. What Bagdad was for Asia the university at Cordova was for Europe, where, particularly in the tenth century, the Arabians were the chief pillars of literature. At a time when learning found scarcely anywhere else a place of rest and encouragement, the Arabians employed themselves in collecting and diffusing it in the three great divisions of the world. In Spain were established numerous academies and schools, which were visited by students from other European countries; public libraries were collected, one of them said to contain 600,000 volumes; and important works were written on geography, history, philosophy, medicine, physics, mathematics, and especially on arithmetic, geometry, and astronomy. There are a number of terms still in use, such as *almanac*, *algebra*, *alcohol*, *azimuth*, *zenith*, *nadir*, which were borrowed originally from the Arabs.

Most of the geography in the middle ages is the work of the Arabians. Among their chief writers on geographical subjects are El-Istakhri (Liber Climatum, edited by Möller, Gotha, 1839), Abu-Ishak-al-Faresi, Ibn-Haukal, who wrote about 815, El-Edrisi, 1150 (French translation published by Jaubert in 1836 at Paris), Yakuti, who died in 1249, and Abulfeda; and much that the most renowned among them, Abulfeda and Edrisi, have written, is still useful and important in regard to historical geography. Even more important than the geographical text-books are the descriptions of countries which were written by Arab travellers; such as those by Ibn-Foslan, who travelled in Russia in the ninth century; by Mohammed ibn-Batuta, who travelled in Africa, India, China, Russia, &c., in the thirteenth century; and by Leo Africanus, who travelled in Africa and Asia in the fifteenth century.

The Arabian historians since the eighth century have been very numerous, though they have not yet been long enough known to European scholars to enable them to derive full advantage from them. The oldest known historian is Hesham Ben-Mohammed Al-Kelbi (died 819). Several other historians lived in the same century. Masudi, the Persians Tabari and Hamsa of Ispahan, and the Christian patriarch Ibn el Batrik or Eutychius of Alexandria, were the first that attempted universal histories. These were followed by Abulfaraj and George Elmakin, both Christians, Abulfeda, Nuvairi, Alfachri, and others. Native historians wrote on the history of the Arabs in Spain and in Mauretania; others, such as Abdullatif and Makrisi, wrote on the history of Egypt; others compiled biographical dictionaries or wrote lives of individuals. The style of most of the historians is simple and void of ornament.

The philosophy of the Arabians was of Greek origin and derived principally from that of Aristotle, who through them became known in Spain and thence in all the west of Europe, having been translated from Arabic into Latin. Hence the origin of the scholastic philosophy may he traced to the Arabians. The Arabians seem to have become acquainted with the works of the Greek philosophers in Bagdad, where a knowledge of them was disseminated by the Nestorian Christians who had been expelled from Syria in the fifth century and found refuge and patronage in Persia. During the eighth and ninth centuries numerous versions of the principal works of Aristotle were made into Syriac and thence into Arabic; and once Aristotle had been introduced to their knowledge the Arabian philosophers both in the east and the west did little else than advance nearer and nearer to a faithful interpre-

tation of that master. Of their philosophical authors the most celebrated are Alfarabi (died 950), who wrote on the principles of nature; Ibn Sina, or Avicenna, who was born about 980 and died A.D. 1037, and, besides other philosophical writings, was the author of a treatise on logic, physics, and metaphysics, and of a commentary on the works of Aristotle; Alghazzali (1058–1111), who wrote a work attacking all heathen philosophical systems; and in Spain Avicebron (died 1070), a Jew, the same with Solomon ben Gebirol; Ibn Badja, known to Europeans as Avempace (died 1138); Ibn Tofail (died 1190); and (the greatest of them all) Ibn Roshd, or Averroes (1126–1198).

Nearly all the Arabian philosophers were at the same time physicians; for the physical sciences, including medicine, were not then separated from philosophy. At Jondisabur, Bagdad, Ispahan, Firuzabad, Bokhara, Cufa, Bassora, Alexandria, and Cordova, from the eighth to the eleventh century, medical schools were instituted, and with the devoted study bestowed on this branch of science the nation could not fail of making important advances in it, though, in reality, they were here also dependent on the Greeks. Anatomy made no progress among them, because the Koran expressly prohibited dissections. To their famous writers on medicine belong Aharun (who first described the smallpox), Jahiah Ben Serapion, Jacob Ben Ishak Alkendi, John Mesve, Rhazes, Ali Ben Abbas, Avicenna (who published the Canon of Medicine, for a long time the best work of the kind), Ishak Ben Soleiman, Abulcasim, Ibn Zohar, Averroes (the author of A Compendium of Physic).

Mathematics the Arabians enriched, simplified, and extended. Mohammed Ben Musa and Thabet Ben Korrah particularly distinguished themselves in this department. Nassireddin translated the Elements of Euclid. Jeber Ben Afla wrote a commentary on the Trigonometry of Ptolemy. Astronomy was especially cultivated, there being famous schools and observatories at Bagdad and Cordova. As early as A.D. 812 Alhazen and Sergius had translated into Arabic the Almagest of Ptolemy, the first regular treatise on astronomy. Albatani, in the tenth century, noted the advance of the line of the earth's apsides and the obliquity of the ecliptic. Alpetragius wrote a theory of the planets. Geography was treated scientifically, in connection with mathematics and astronomy, particularly by Abulfeda.

Much as the severer sciences were cultivated the genius of the people for poetry was not fettered. After the ninth century the oriental peculiarities of Arabian poetry became more and more strong: the tone grew mystical and extravagant and the language lost its purity. Motenabbi deserves to be noticed for his tender elegies in a classic style; Abu Ismael Tograi, vizier of Bagdad, for his elegies and poems; Hariri for his history of an unscrupulous but amusing vagabond in his work entitled Mekâmmât, admirably translated into German by Rückert, into English by Chapellon and Preston; Ibn-Arabshah for his narrative tales, &c.; Asmai for his great heroic romance, Life of Antar. The dramatic excepted there is no sort of poetry which the Arabians have left unattempted. There is no doubt that they had by this means a powerful effect on modern European poetry, for no small share of the romantic poetry of the middle ages belonged to the Arabians. The tales of fairies, genii, enchanters, and sorcerers in particular, passed from the Arabians to our western poetry. Some of the books most widely read in the middle ages, such as The Seven Wise Masters and the Fables of Pilpay, found their way into Europe through the instrumentality of the Arabs. To this rich and many-sided intellectual life among the Arabs in the middle ages the intellectual poverty of the present and past two or three centuries offers a striking contrast. Arab literature now scarcely offers anything worthy of notice. Learning is chiefly confined to the production of commentaries and scholia, discussions on points of dogma and jurisprudence, and grammatical works on the classical language. Among authors who have written to a certain extent under the influence of European culture, we must mention Michael Sabbagh of Syria (The Carrier Pigeon, Arabic and French, Paris, 1805); Sheikh Refaa of Cairo (The Broken Lyre, Paris, 1827; Manners and Customs of the Europeans, Cairo, 1834); Nasif-Effendi of Beyrout, who produced a work of the same character as that of Hariri (Beyrout, 1856); and Ahmed Faris (died 1887), journalist and miscellaneous writer. Translations of modern European works (Jules Verne's and others) are pretty numerous. A number of newspapers and periodicals are now published in Arabic.

ARABIAN GULF. See RED SEA.

ARABIAN NIGHTS, or the THOUSAND AND ONE NIGHTS, a celebrated collection of tales, long current in the East, and supposed to have been derived by the Arabians from India, through the medium of Persia. They were first introduced into Europe in the beginning of the eighteenth century by means of the translation of Antoine Galland, a distinguished French orientalist, which was hailed with universal delight, and soon became one of the most popular works in Europe. The story which connects the tales of the Thousand and One Nights is as follows:—The Sultan Shahriyar, exasperated by the faithlessness of his bride, made a law that every one of his future wives should be put to death the morning after marriage. At length one of them, Shahrazad, the generous daughter of the grand-vizier, succeeded in abolishing the cruel custom. By the charm of her stories the fair narrator induced the sultan to defer her execution every day till the dawn of another, by breaking off in the middle of an interesting tale which she had begun to relate. The delight felt by Shahriyar has been felt by multitudes more, and the universal popularity of the Arabian Nights is unequivocally evinced by the numerous translations in different European languages which have appeared since the time of Galland. In general they aim merely to delight the fancy, but frequently display much practical wisdom, with a profound knowledge of human nature. They are doubly interesting to the European reader, because they place before him, in a far more striking light than travellers can do, the peculiarities of eastern nations. The Arabian Nights do not rank as one of the classical works of Arabic literature, as they belong to a comparatively late period, though the exact date of their composition is not known. Mr. Lane, who resided for years at Cairo, now the chief Arab city, and who published an excellent (abridged) translation of these tales, with numerous most valuable notes (London, 3 vols., 1839), was of opinion that they took their present form some time between 1475 and 1525. A complete (unexpurgated) translation of great value by Sir R. F. Burton has been published (10 vols., and six supplementary vols.), with a somewhat abridged edition by Lady Burton (6 vols.). There is also a modern translation by Mr. Payne (9 vols., and three supplementary vols.). Some tales that have become well known in connection with this work do not properly belong to it—the story of Ali Baba for instance.

ARABIAN SEA, the north-west portion of the Indian Ocean, lying between Arabia on the west and India on the east.

ARABIC FIGURES. See ARITHMETIC.

ARACACHA, or ARRACACHA (*Arracacia escu*

lenta), an umbelliferous plant with a tuberous root, a native of the chain of the Andes, and extensively cultivated in the province of Santa Fe de Bogotá, in South America, where its tubers form an agreeable and universal article of diet. Its nutritious qualities have suggested at different times its introduction into Europe, but all attempts to naturalize it there have hitherto failed.

ARACAN. See ARRACAN.

ARACHIS (*Arachis hypogœa*), also termed the *earth-nut*, is a leguminous plant much cultivated in warm climates, and which has also been successfully introduced into Spain and France. It is an annual, with small yellow sessile flowers, generally in pairs. The pods possess the curious property of taking a downward direction, and ripening their seeds underground, from which the name of earth-nut is derived. The seeds, two or three in number, of the size of a hazel-nut, have a sweet flavour resembling almonds, and yield an oil not inferior to that of olives. It is said to be advantageously employed as a substitute for cocoa in the manufacture of chocolate.

ARACHNIDA (Greek, *arachnē*, a spider), a class of Arthropoda or higher Annulose animals, including the Spiders, Scorpions, Mites, Ticks, &c. The Arachnida are nearly allied to the Crustacea, having the body divided into a variable number of segments or *somites*, some of which have always articulated appendages, and having a pair of ganglia primitively developed in each somite, although in some forms (for example spiders) the nervous system becomes modified and concentrated. They differ from the Crustacea, however, in never having branchiæ, but pulmonary vesicles, or sacs for breathing air directly instead, while the locomotive limbs are never more than four pairs, and the somites of the abdomen are never provided with limbs. The locomotive limbs are mostly similar to those of insects. The head and thorax, as in Crustacea, are always conjoined, and form together what is called the 'cephalothorax;' the integument is chitinous, either wholly or partly soft, or forming a hard shell. The mouth in the higher Arachnida possesses a pair of 'mandibles' for prehension (the mandibles of Arachnida being supposed to correspond with the antennæ of other Arthropoda—antennæ as such being absent in the Arachnidans); a pair of 'maxillæ,' each provided with a long-jointed appendage called a 'maxillary palp' (in the Scorpion the palpi form large nipping claws); and thirdly, a 'labium' or lower lip. In the Spiders each mandible terminates in a poison fang or hook. The intestinal canal is short and straight; the circulation is generally maintained by an elongated dorsal vessel or heart; respiration is effected by the general surface of the body, by ramified air-tubes ('tracheæ'), or by pulmonary sacs; reproduction is mostly oviparous, and the sexes are generally distinct. The class is divided into two sections—*Trachearia*, in which respiration is effected by the surface of the body or by tracheæ; and *Pulmonaria*, which respire by pulmonary sacs, or by sacs and tracheæ combined. The former include the Mites, Ticks, &c., the latter the Scorpions and Spiders. (See plate inserted at article CRUSTACEA.)

ARACK, ARRACK, or RACK, a name common in the East for a strong spirituous liquor which is distilled from rice, from the juice of the cocoa-nut, date, and other palms, or from molasses. The arack of Goa and Colombo in Ceylon is distilled from palm-juice alone, after it has been allowed to ferment (then making palm-wine, *callu*, or toddy); that of Batavia and Jamaica from rice and molasses, with the addition of a small quantity of toddy, but not from rice alone. The rice is turned into malt by being soaked in water and allowed to sprout, after which the arack is distilled from it on fermentation taking place in the same way as whisky from barley-malt. The rice is also often used without being malted. The molasses and toddy are added to the wort when it is set to ferment. The distillation of the fermented liquor affords the third or worst sort of arack; this mixed with a little water and again distilled gives the second best sort; a third distillation produces the best sort, which is seldom exported. The arack sold in Europe is seldom genuine. Pure arack is clear and transparent, with a yellowish or straw colour, and a peculiar but agreeable taste and smell; it contains at least 52 to 54 per cent. of alcohol. Not much of it is imported into England, but it is largely drunk in India and the East generally, the Indian and Pacific Islands, Africa, and South America.

ARAD, a market-town in Hungary, on the Maros, 30 miles north of Temeswar, divided by the river into O (Old) Arad and Uj (New) Arad. It is an important railway centre, and has a large trade in grain, wood, wine, and spirits, the last of which it produces in greater quantity than any other town in the Austrian Empire. It has also large manufactures of flour, starch, leather, and machinery. There is here a strong fortress, situated on a spit of land between two arms of the Maros. Uj or New Arad lies across the river from Old Arad, in the Banat of Temeswar; a bridge which connected the two was destroyed during the revolution, but has since been rebuilt. The population of Old Arad in 1890 was 43,688, of New Arad, 5555; total in 1900, 56,220.

ARAFAT, or JEBEL ER RAHMEH ('Mountain of Mercy'), a hill in Arabia, 15 miles south-east of Mecca. It is one of the principal objects of pilgrimage among Mohammedans, who say that it was the place where Adam first received his wife Eve after they had been expelled from Paradise and separated from each other 120 years. On the summit is a chapel believed by the Mohammedans to have been built by Adam. The mountain not being large enough to contain all the devotees that come annually on pilgrimage to Mecca, stones are set up round it to show how far the sacred limits extend. A sermon delivered on the mount constitutes the main ceremony of the Hadj, and entitles the hearer to the name and privileges of a Hadji. The hill is about 200 feet high, with stone steps reaching to the summit.

ARAGO, DOMINIQUE FRANÇOIS, a celebrated French natural philosopher, born at Estagel, near Perpignan, in 1786; died at Paris October 2, 1853. After studying at the college of Montpellier and the Polytechnic School at Paris he was appointed secretary of the Bureau des Longitudes. In 1806 he was associated with Biot and the Spanish commissioners Chaix and Rodriguez in completing the measurements of Delambre and Mechain to obtain an arc of the meridian, which was to serve as the basis of a new metrical system. In 1809 he was elected to fill the seat left vacant by the death of Lalande in the Academy of Sciences. He was at the same time appointed a professor of the Polytechnic School. In 1811, following up the discovery of polarization of light by Malus, he communicated to the Institute a paper on a particular modification which the luminous rays experience in their passage through certain transparent bodies, by which he paved the way for a number of the most brilliant discoveries which have been made in optical science since the days of Newton. In 1812 he commenced a series of lectures on astronomy, which created an immense sensation. Mr. Kelly has translated them. Along with Gay Lussac he established in 1816 the Annales de Chimie et de Physique. His discovery of the magnetic pro-

perties of substances devoid of iron, made known to the Academy of Sciences in 1824, procured him the Copley medal of the Royal Society of London in 1825. A further consideration of the same subject led to the equally remarkable discovery of the production of magnetism by electricity. In 1830, on the death of Fourier, Arago succeeded him as perpetual secretary to the Academy of Sciences. In the same year he became director of the Observatory. This also was the year of the revolution of July, and after the expulsion of the Bourbons Arago was elected to the chamber of deputies as representative of the Pyrénées-Orientales, and took his place on the extreme left. He proved a ready and effective speaker. The revolution of 1848 brought him still more prominently upon the scene, first as minister of war and marine in the provisional government, and then as a member of the executive committee of the National Assembly. When Louis Napoleon succeeded in obtaining the sovereignty Arago determined to resign his place at the Bureau des Longitudes sooner than take an oath to the new constitution; but the oath was not pressed, and he continued undisturbed in the possession of his place. His works were posthumously collected and published under the care of J. A. Barral (Paris, seventeen vols. 1854–62). They consist, besides his Astronomie Populaire, chiefly of contributions to learned societies, and biographical notices (*éloges*) of deceased members of the Academy of Sciences composed in his capacity of secretary to that body.

ARAGON, Kingdom of. See Arragon.

ARAL, a salt-water lake in Asia, next to the Caspian Sea the largest inland collection of water in that continent. It lies in Russian territory, amid the plains of the Turcomans and Kirghises. Its length is estimated at 270 miles, its breadth at 165, and its area at about 27,000 square miles. It receives the Amoo Daria or Oxus and the Sir Daria or Jaxartes, and contains a multitude of sturgeons and other fish. It is encircled by desert sandy tracts, and its shores are without harbours. It has no outlet, the superfluous water being drawn off by evaporation. It is not very salt, however, 1000 parts of the water containing only 15 parts of salt. It was once, probably, united with the Caspian Sea, the eastern coast of which is separated from the western coast of the Aral only by 80 miles of low sandy and marshy lands; but such a connection if it existed was probably as old as the Tertiary period. At present the Aral is about 242 feet higher than the Caspian. The Aral contains a large number of small islands, especially along its eastern shores. Steamers have been placed on it by the Russians, but only for government purposes.

ARAM, Eugene, a man of considerable learning, and remarkable for his unhappy fate, was born in Yorkshire, 1704. His education consisted in learning to read, but being of a studious disposition he made great progress in mathematical studies and in literature by his own unaided exertions. He acquired the Latin and Greek languages, reading all of the Roman and most of the Greek classics, and also became acquainted with the oriental and Celtic tongues. In 1734 he set up a school at Knaresborough, where he married. About 1745 a shoemaker of that place, named Daniel Clarke, was suddenly missing under suspicious circumstances; and no light was thrown on the matter till full thirteen years afterwards, when an expression dropped by one Richard Houseman respecting a skeleton then discovered in a cave caused him to be taken into custody as one concerned in the murder of Clarke. From his confession an order was issued for the apprehension of Aram, who had long since quitted Yorkshire, having been usher, first in a school in London, and afterwards at another at Hayes, in Middlesex, and in 1757 at the grammar-school at Lynn, in all which places he had acquitted himself with credit, and prosecuted his studies with great diligence. He was arrested in the latter end of 1758, and brought to trial on the 3d of August, 1759, at York, where, notwithstanding an able and eloquent defence which he made before the court, he was satisfactorily convicted of the murder of Clarke, and sentenced to death. He was hanged at Tyburn, August 16, 1759. After his conviction he confessed the justice of his sentence, and alleged his suspicion of an unlawful intercourse between Clarke and his wife as his motive for the commission of the murder. He attempted to end his life while in prison by bleeding, but was revived and executed. His case produced at the time a great sensation, and has been pressed into the service of fiction. Hood's Dream of Eugene Aram and Lord Lytton's novel of Eugene Aram are well known.

ARAMÆAN, or Aramaic, a language composed of two principal dialects, the Babylonian or East Aramaic (improperly though usually called Chaldee), and the Syriac or West Aramaic. The former is seen in sections of Daniel and Ezra, and is partly used in the Talmud. It has a very close affinity with the Hebrew. The oldest specimens of the latter are seen on some inscriptions of Palmyra. Both dialects are nearly extinct, but are yet spoken by some tribes of ancient Aram. See Hebrew.

ARANJUEZ, a small town and palace in Spain, in the province of Madrid, with splendid gardens, beautiful walks shaded with elms, a park for hunting, &c. It is situated in a charming shady vale of the Tagus, 30 miles from Madrid, to which a great road built by Ferdinand VI. leads, every mile of which cost 3,000,000 reals, about £30,000 sterling. The court used to reside here from Easter till the close of June, when the number of people increased from 8000 to about 20,000. Philip II. founded the palace and garden. His successors, particularly Ferdinand VI., Charles III., and Charles IV., improved and greatly enlarged it. The palace of Aranjuez has been often celebrated by Spanish poets, and is renowned for its gardens, shaded walks, and water-works. The gardens are in the form of a star. The chief walk, overshadowed by elms, is 600 or 700 paces long and 12 feet wide. The huge elms, the herds of mules and buffaloes, the grounds under tillage, the orchards and gardens, form the chief attractions of the place, but it has few recommendations as a residence, the winter being cold and damp, and the summer almost pestilential, in consequence of noxious exhalations of the waters and marshes. Pop. (1900), 12,670.

ARARAT, a celebrated mountain in Armenia, forming the point of contact of Russia with Turkey and Persia, to all of which it belongs. It rises, an isolated volcanic cone, on the southern border of the plain of the Aras or Araxes. South-east from Mount Ararat proper, or the Great Ararat, rises the Little Ararat, their summits in a direct line being about 7 miles apart, and their bases insensibly blending into each other by the interposition of a wide, level, upland valley. The summit of the Great Ararat rises 16,964 feet above the sea-level. It is covered with perpetual snow and ice for about 3 miles from its summit downward in an oblique direction. On the entire north half it shoots up, from about 14,000 feet above the sea, in one rigid crest to its summit, and then stretches downward on its south side to a level not quite so low, forming the Silver Crest of Ararat. Little Ararat rises 13,093 feet above the sea. Its declivities are steeper than those of the Great Ararat. The mass of Ararat forms a feature of stupendous grandeur in the landscape, as it shoots up abruptly

from the plain. It is of volcanic origin, but there is only one eruption of the mountain on record. This, accompanied by an earthquake which destroyed 6000 houses, took place in 1840. The top of the Great Ararat was first reached by Professor Parrot in 1829; it has been repeatedly reached since. According to tradition Mount Ararat was the resting-place of the ark when the waters of the flood abated.

ARAROBA, a drug obtained from the bark of *Andira araroba*. See ANDIRA in SUPP., also CHRYSOPHANIC ACID.

ARATUS, a Greek poet, born at Soli (Pompeiopolis), in Cilicia. He flourished about 270 B.C., was a favourite of Ptolemy Philadelphus, and a firm friend to Antigonus Gonatas, son of Demetrius Poliorcetes. We know him only from his poem Phænomena, in which he has given us, in correct and elegant verse, all that was then known of the heavens, with their signs and appearances, although there is reason to believe that he was not himself an astronomer. A well-known quotation by St. Paul, in his address to the Athenians, is from this poet: 'For we are also his offspring', Acts xvii. 28.

ARATUS OF SICYON. See ACHÆANS and GREECE—History.

ARAUCANIANS, a South American native race, in the southern part of Chili. They occupy a territory containing 64,000 square miles, and stretching from 37° 29′ to 40° 18′ of S. lat. The Araucanians are of stout build and moderate height; have light olive complexions, round faces, low foreheads, short broad noses, small fiery eyes small lips, and long heads. Polygamy prevails, and the women do all the domestic and field work, the men confining themselves to the chase, the tending of cattle, and, till within recent times, to war. The territory was divided into four provinces, each governed by a toqui or chief. Those chiefs formed the grand national council, which was presided over by the grand toqui, chosen from their own number. Each toqui had under him five apoulmenes (district chiefs), to each of whom were subordinate nine ulmenes (township rulers). The ulmenes and apoulmenes (who succeeded by primogeniture) formed the general assembly of the nation, and were called together by the grand council to decide on war or peace, the election of a military commander, &c. Their religion corresponds to their old political institutions; their supreme being is the grand toqui of the universe, who has under him ulmenes to look after details. They also believe in an evil deity. The Araucanians have no temples nor idols, support no priests, and but rarely sacrifice. After death the soul passes into a happy region which lies beyond the Andes. They have been long noted for their love of independence, and for the bravery with which they withstood the arms of their Spanish and Chilian invaders. The Spaniards first entered the territory in 1537, and formed settlements, which were all destroyed, however, before 1602. War lasted with but slight intervals, until at last in 1773 Spain acknowledged the independence of the Araucanians. In the war between Chili and the mother country they preserved a strict neutrality. In 1861 a French adventurer, Antoine Tounens, proclaimed himself constitutional king under the title of Orelio Antonio I. The Chilians, who had decided on the conquest of Araucania, took him prisoner and sent him back to France. In 1870 he returned to take part in the still-continued fight for freedom but was finally driven out of the country and died in 1877. In 1882 the Araucanians peaceably submitted to the Chilians.

ARAUCARIA is the name of a genus of trees of the coniferous or pine order, belonging to the southern hemisphere. The Norfolk Island pine (*Araucaria excelsa*, also named *Eutassa excelsa*) is common to several of the South Sea Islands, where it attains a height of 220 feet with a circumference of 30 feet, and is described as a majestic tree. Its timber is of some value, being white, tough, and close-grained. It is incapable of resisting the winter climate of Britain, but grows vigorously under protection, and soon becomes too large for the loftiest greenhouse. The Moreton Bay pine (*A. Cunninghami*) bears a very close resemblance to this species. The *Araucaria imbricata*, a native of South America, is a noble species, and being found to bear the British winters has been introduced in all quarters for the decoration of lawns and parks, since it is considered one of the finest ornamental trees, and on account of its prickliness is never touched by cattle. It is a native of the Cordilleras of Chili, and was first brought to this country in 1796 by Mr. Menzies, who as surgeon accompanied Vancouver's expedition. In its native abodes it requires an alpine atmosphere and a severe climate. In the region of the Andes the tree grows to a height of 150 feet. The trunk is straight, without knots, and covered with a double bark, which in old trees is 5 or 6 inches thick; and from it, as from almost every other part, resin flows in abundance. In young trees the bark is studded with leaves from the base of the tree upwards, which remain attached for twelve or fifteen years. The branches are produced in whorls of six, seven, or sometimes eight in a whorl, the greater number being nearest the ground; and the branches diminish in length as they ascend higher up the tree till they terminate at the top in a sort of pyramidal head. They are horizontal, inflexed, and turned up at the extremities. The cones, when fully ripe, are globular, and from 3 to 4 inches in diameter. The tiers of branches bear a fixed proportion to the age of the tree. To tell the age of a growing araucaria count the tiers of branches and add one half the number, making allowance for the unbranched terminal shoot, if any; this will give nearly the age of the tree. The wood of the tree in its native forests is described as being of a yellowish-white colour, fibrous, full of beautiful veins, and capable of being polished and worked with facility. The resin is white, smells like frankincense, and tastes not unpleasantly. The seeds are eaten fresh, boiled, or roasted.

ARBELA, now *Erbil*, a small place in Eastern Assyria, renowned for a decisive battle fought by Alexander the Great against Darius, at Gaugamela, about 20 miles distant from it, October 1, B.C. 331.

ARBITRAGE, the system by which fluctuations in the prices of stocks and shares and the varying rates of exchange at different financial centres are taken advantage of by buying in the cheaper and selling in the dearer market, with a small margin of profit.

ARBITRATION, the settlement of a controversy by private persons appointed to decide it, and not by an ordinary court of law. The English law relating to the subject is contained in the Arbitration Act, 1889, by which a submission to arbitration is defined as 'a written agreement to submit present or future differences to arbitration, whether to an arbitrator named therein or not'. The submission is an agreement to accept the decision, and not the advice only, of the person or persons appointed, and the award, when properly made, will be binding upon the parties. The submission is in the nature of a commission by both parties to the arbitrators to determine the subject in dispute, and has the same effect as if it had been made an order of court. If either party refuses to proceed with the arbitration, the other party will be entitled to damages against the party so revoking for the breach of his

agreement to submit the matter in dispute to arbitration. The course of procedure in an arbitration is similar to that of an ordinary trial at law. The rules of evidence must be observed, and the attendance of witnesses and the production of documents can be enforced on subpœna. An arbitrator may decide on a point of law, or may refer it to a court, or may have a legal assessor to sit with him. Various special acts of parliament make provision for arbitration in regard to subjects with which they deal, as agricultural holdings, workmen's compensation, &c. The laws of most countries favour the settlement of disputes by arbitration. The parties may agree in court to refer their case to arbitration, and the judges will recognize the agreement. Crimes cannot be made the subjects of adjustment and composition by arbitration, for the public is here one party; but the personal injuries and pecuniary damage resulting from crimes or breaches of the peace may be made subjects of reference. As to the persons who may agree upon a submission, any one may do so who is capable of making a disposition of his property, or a release of his right; but one under a natural or civil incapacity cannot, as a married woman or minor. The arbitrators chosen by the parties are often authorized to choose an umpire, in case they disagree. As an arbitrator is a judge who receives a commission from the contending parties, it must be left to them to decide on his qualifications, and the laws do not generally make any specific provisions on this subject. If, however, it appears that the arbitrator was interested, and his interest was unknown to one of the parties, or that he was bribed, or that any other strong objection lay against his acting as arbitrator, exception may be made to the award on that account. Arbitration has been frequently adopted in modern times as a mode of settling international disputes, as in the case of the 'Alabama Claims' (see ALABAMA); and will probably be still further employed in such affairs. See HAGUE CONFERENCE.

ARBLAY, MADAME D', originally Miss Frances Burney, was born in 1752 at Lynn-Regis in Norfolk, and was the second daughter of Dr. Burney, author of the History of Music, who was then organist in that town. When she reached her eighth year her father removed to London, where he lived on terms of intimacy with some of the most distinguished men of the time. She informs us in her diary that at ten years of age she wrote 'elegies, odes, plays, songs, stories, farces, nay tragedies, and epic poems,' but at fifteen she burned all her juvenile productions. She afterwards produced a novel in three volumes, under the title of Evelina, or the History of a Young Lady's Introduction to the World, for which Lowndes, the publisher, gave her £20. It appeared anonymously in 1778, and was criticized favourably, not only by the monthly reviewers, but also by Reynolds, Burke, Johnson, and other celebrities of the day. The secret of the authorship was so well kept that the work had been six months published before even her father knew that it was hers; but when it became known, Miss Burney passed at one step from obscurity to celebrity. Her second novel, Cecilia, or the Memoirs of an Heiress, which appeared in 1782, obtained immediate success and brought her £2000. In 1786 she was appointed one of the keepers of the robes to Queen Charlotte, with a yearly salary of £200; but this situation, on account of the irksomeness of the duties, which seriously affected her health, she resigned in 1791. In 1793 she married the Count d'Arblay, a French emigrant artillery officer, and the same year she published a pamphlet entitled Brief Reflections relative to the Emigrant French Clergy. In 1795 her tragedy of Edwy and Elgiva was brought out at Drury Lane, but proved a complete failure and was never printed. The next year she produced another five-volume novel, Camilla, a Picture of Youth, which was published by subscription and realized above £3000, but added little to her reputation. After the peace of Amiens in 1802 she accompanied her husband to Paris, from which she returned in 1812, and purchased a handsome villa called Camilla Cottage. In 1814 she published her last and dullest fiction, The Wanderer, or Female Difficulties, also in five volumes, for which she is said to have received £1500. On the restoration of the Bourbons her husband was raised to the rank of general. Madame d'Arblay rejoined him in Paris, and they afterwards settled in Bath, where the general died in 1818. The only other work which Madame d'Arblay lived to give to the world was the memoirs of her father, which appeared in 1832 in three vols. 8vo, a book written in a heavy, pompous, and involved style, so totally different from that of her novels, as to read like an elaborate caricature of Johnson or Gibbon. It contains, however, much interesting information. In 1837 she lost her only son and sole issue of her marriage, the Rev. A. C. Louis d'Arblay, perpetual curate of Camden Town. Her own death took place at Bath on the 6th January, 1840. Her Diary, edited by her niece, was completed in seven vols. in 1846, and has been since reprinted.

ARBORICULTURE includes the culture of trees and shrubs, as well as all that pertains to the preparation of the soil, the sowing of the seeds, and the treatment of the plants in their young state, the preparation of the land previous to their final transplantation, their just adaptation to soil and situation, their relative growth and progress to maturity, their management during growth, and the proper season and period for felling them. We cannot here enter upon all these different topics, and must content ourselves with touching upon one or two. The selection of a suitable soil and situation for the different trees is one of the most important points in arboriculture. A spruce-tree will thrive well for six or seven years in a dry sandy soil; but at twenty years of age it is covered with lichen, its under branches are withered, and the whole plant at a stand-still. Plant it on a slope towards the north, or at the foot of a hill where the soil is loamy and damp, and it will present quite another picture. So an oak may grow vigorously enough for a time if planted on an exposed upland, but the clayey soils of the valley are its natural home. The young plants have their preferences as well as the older trees, but, generally speaking, a loose sandy loam makes excellent nursery ground. The propagation of young trees in a nursery is effected by sowing the seeds of the respective kinds, by layers, by cuttings, and in some cases by budding and grafting. The treatment varies so much in respect to some of the kinds that no general rules can be laid down. When permanent situations are selected for the young plants it must be kept in mind—First, that fast-growing or soft-wooded trees, such as the alder, willow, poplar, lime, and horse-chestnut, generally affect moist lands, or such as are near water. It is true they will grow on dry lands, but their want of vigour and comeliness shows that these are not the situations they prefer. These trees, from the fastness of their growth, are the kinds that are chosen by those who wish to have large timber for shade or ornament in a short time; and an important consideration connected with them is that for the most part they are grown on soil that could not be made available for any other crop. Second, cone-bearing or resinous trees, such as the Scotch pine, pinaster, larch, spruce, silver fir, and cedar, are naturally dispersed over cold and elevated districts where the soil is thin and poor. The uses to which the

wood of this class of trees is put are endless. In considering the relative value of these trees as grown in Britain, the Scotch pine and larch take the lead, being followed by the spruce. In some respects the larch excels the Scotch pine, since the latter takes eighty years to mature, while the former may be used at forty. These trees are very useful also as nurses and shelter for the hardwood trees, enabling these to be grown where otherwise they could not. They also make very effective objects in the landscape, especially the grand and rugged Scotch pine. Third, broad-leaved timber-trees generally prefer good lands, rejecting such, on the one hand, as are in elevated situations affected by a rigorous climate, and on the other hand all such as are in very low situations overcharged with moisture. These trees are the ash, beech, birch, elm, hornbeam, locust, oak, plane, Spanish chestnut, sycamore, and walnut. As a source of profit these trees are not equal to the foregoing class, as many of them occupy lands that would yield heavy crops of grain. Still they are frequently grown where corn would not be a profitable crop; and besides, an indirect profit is derived from them in the shelter they afford, not to speak of their picturesque beauty and attractiveness. The planting of trees has been extensively carried out in Britain during the present century, and woods have been raised on lands which were formerly regarded as useless. Wide stretches of heath lands, for instance, have been covered with trees, and sea-side planting has also proved successful.

ARBOR VITÆ, the name of several trees belonging to the genus *Thuja* and the natural order Coniferæ, allied to the cypress. The genus consists of evergreen trees and shrubs, with flattened branchlets, and small imbricated or scale-like leaves. The common Arbor Vitæ (*Thuja occidentalis*), which is so common in our ornamental shrubberies, is a native of North America, where it grows to the height of 40 or 50 feet, though it scarcely reaches that height in this country. The cones are small; the young twigs have an agreeable balsamic smell; the wood is soft and light, but tough and durable. The Chinese Arbor Vitæ (*Thuja orientalis*) is also common in Britain. Its upright branches and larger cones easily distinguish it from the former. It yields a resin which was formerly thought to have medicinal virtues, like the wood and young twigs of the *Thuja occidentalis;* hence the name—*arbor vitæ* being Latin for 'tree of life.'

ARBROATH, or Aberbrothock, a royal and parliamentary burgh and seaport town in the county of Forfar, Scotland, situated at the embouchure of the small river Brothock into the German Ocean, 56 miles north-east from Edinburgh. The early history of Arbroath is chiefly connected with its abbey, the ruins of which afford striking proofs of its former magnificence. King William the Lion granted the privileges of a royal burgh to Arbroath about the middle of the twelfth century, and founded the abbey in 1178, which was dedicated to the memory of Thomas Becket. Its last abbot was Cardinal Beaton, after whose death it fell a prey to the excessive zeal of the reformers. The town, now sufficiently connected by railway with the north and south of Scotland, and provided with a small harbour, has made rapid progress in recent years, has several handsome buildings, including a parish church with an elegant spire; and has numerous spinning-mills and factories in which yarn is spun from flax and hemp, and much canvas and linen are manufactured. Tanning, shoemaking, and fishing are also carried on. The tonnage belonging to the port on Dec. 31st, 1904, was 803; the shipping entered in 1904 was 18,170 tons; cleared, 16,935. Arbroath unites with Montrose Forfar Brechin, and Bervie (the Montrose burghs) in sending a member to Parliament. Pop. in 1861, 17,593; in 1891, 22,960; in 1901, 22,372.

ARBUTHNOT, John, an eminent physician and distinguished wit, was born at Arbuthnot, Kincardineshire, Scotland, in 1667, being the son of an Episcopalian clergyman there. He received the degree of Doctor of Medicine at the University of St. Andrews, and engaged in the business of teaching mathematics in London, where he soon distinguished himself by his writings and by his skill in the practice of his profession. In 1704 he was chosen fellow of the Royal Society, in consequence of his communicating to that body a curious and instructive treatise 'On the Regularity of the Births of the Sexes;' and soon after he was appointed physician extraordinary, and then physician in ordinary to Queen Anne. About this time he became intimate with Swift and Pope, and this brilliant triumvirate formed the plan of a satire on the abuses of human learning. But the completion of this design was interrupted by the death of the queen, and we have only an imperfect essay, under the title of Memoirs of Martinus Scriblerus. The death of Queen Anne made such an impression on Doctor Arbuthnot, that, to divert his melancholy, he visited Paris, and on his return was deprived of his place at St. James'. He continued, however, the practice of his profession, and in 1723 was chosen second censor of the Royal College of Physicians, and afterwards an elect of the same college. He died in 1735. Among the works of Dr. Arbuthnot are, Table of Ancient Coins, Weights, and Measures (1727); the treatise on the Nature and Choice of Aliments (1732); and that on the Effects of Air on Human Bodies (1733); his History of John Bull, his contributions to Martinus Scriblerus, his Art of Political Lying, and other pieces usually published in Swift's works.

ARBUTUS, in botany, a genus of plants belonging to the Ericaceæ, or heath order. *Arbutus Unedo* bears a fleshy fruit like the strawberry, and is hence called the strawberry-tree. It is a native of the south of Europe and the Levant. In the gardens of this country it proves a hardy evergreen, producing its blossoms about the month of October, and its fruit in November and subsequent months. At the Lake of Killarney the arbutus forms groves of singular beauty. The plant, however, is not considered to be indigenous to Ireland.

ARC, Jeanne d'. See Joan of Arc.

ARCADE, a row of arches supported by columns. There are in some of our principal cities ranges of shops and warehouses so constructed as to form a covered lane, to which the term *arcade* is applied.

ARCADIA, the central and most mountainous portion of the Peloponnesus (Morea); the Greek Switzerland; bounded on the north by Achaia and Sicyon, on the east by Argolis, on the south by Messenia, and on the west by Elis (these names referring to the ancient divisions). It is rich in rivers, springs, and pastures, and is watered by the Eurotas and Alpheus. The principal mountains were called Cyllene, Erymanthus, Stymphalus, and Menalus. The inhabitants of Arcadia were celebrated among the Greeks for simplicity of character; their manners furnished the theme both of sentiment and humour according as they were associated with purity and piety, or with deficiency of knowledge and intelligence. Their chief deity was Pan, and the occupation of the people almost entirely pastoral. This, together with the romantic character of the country, occasioned the pastoral poets to select Arcadia for the theatre of their fables. At the present day Arcadia forms one of the five Peloponnesian nomarchies of the Kingdom of Greece, and includes, besides

the greater part of ancient Arcadia, a portion of the west side of the Gulf of Nauplia (*Argolicus Sinus*). It presents well-cultivated lands, blooming valleys, and charming woods. The vine flourishes, and the rich and extensive pastures support numerous herds. Area, 2028 square miles; pop. (1896), 167,092.

ARCADIUS, born in 377, was son of the Emperor Theodosius, on whose death in 395 the empire was divided, he obtaining the East, and his brother Honorius the West. He proved a feeble and pusillanimous prince, and, unable to govern for himself, was a mere tool, first in the hands of Rufinus, then of the eunuch Eutropius, and then of his queen Eudoxia. Arcadius died in 408.

ARCESILAUS, a Greek philosopher, the founder of the second or middle academy, was born about 315 B.C. at Pitane, in Æolia. After studying rhetoric he took to philosophy. Various traits of generosity are recorded of him, but his life is said to have been dissolute and immoral, and he died in his seventy-sixth year of a fit of excessive drinking. He left no writings, and of his opinions so little is known that it has been doubted whether he was a strict Platonist or a sceptic. Cicero says he taught that we know nothing, not even the fact of our own ignorance; but Sextus Empiricus says that he taught sceptical opinions as a discipline for his disciples, and afterwards communicated the doctrines of Plato to the most able. As the subsequent tendencies of the academy were sceptical, it appears probable that though he might formally impart the doctrines of Plato the main tendency of his teaching was sceptical.

ARCH, in building. See ARCHITECTURE.

ARCHÆOLOGY (Greek, *archaios*, ancient, and *logos*, a discourse), the science of antiquities, is a term which of late years has come into general use, but which in its earlier acceptation served merely to denote the study of the relics of ancient Greece and Rome. As employed at the present day, it may be generally defined as the science which takes cognizance of the history of nations and peoples as evinced by the remains, architectural, implemental, or otherwise, which have descended from the epoch of their existence to the present day. The term archæology is to a great extent synonymous with *prehistoric annals*, as a large if not the principal part of its field of study extends over those periods in the history of the human race in regard to which we possess almost no information derivable from written records. Much has been accomplished in recent times in elucidation of the primitive history of mankind by the examination and deciphering of various ancient monuments, which had previously either been neglected, or the attempt to discover whose meaning had been abandoned as vain and hopeless. Thus, by the discovery in 1799 of the famous Rosetta stone, bearing a triple inscription in the hieroglyphic or sacred, the popular or Egyptian, and the Greek languages, a key was furnished which, by enabling us to unlock the mysteries of the ancient figure writing as delineated on tombs and monuments, has afforded much information on the history of the early Egyptian monarchy. Similar important results in regard to the ancient Assyrian and Persian kingdoms have followed the labours of the numerous scholars through whose labours we have been enabled to decipher the cuneiform inscriptions of Nineveh and Persepolis. It is more especially, however, with European antiquities and the remains of the primitive nations by which that continent has been colonized, that the modern archæologist finds his attention engrossed. The materials here presented are of the most varied and interesting description, and have supplied important data for determining the questions as to the original settlement of Europe and the nations founded there, by the migration westwards of Asiatic tribes from the primeval seats of the human race in Mesopotamia and Armenia. In the absence of all written records of this migration, except what may be derived from the narrative in Sacred Writ of the dispersion of the human family following the confusion of tongues on the attempt to erect the tower of Babel, and the obscure and fabulous accounts of ancient historians, it becomes necessary to recur to the actual evidence furnished by the existing remains which have been discovered of our progenitors. These consist of the tumuli or barrows in which the ancient nations deposited their dead, the standing stones or monoliths erected sometimes as commemorative and more frequently as religious structures, and the arms, implements, remains of dwellings, &c., which exist of the former inhabitants of our continent, and more especially of its northern regions. As might have been expected, many discordant theories have arisen from the study of these memorials, and where so much must be left to conjecture and speculation it is impossible to trace out the prehistoric epochs with certainty, or mark the limits and times within which each is comprehended. Three distinct periods are now, however, generally recognized among archæologists, and to these the names of the *stone*, *bronze*, and *iron* periods have respectively been attached, as indicative of the degrees of civilization attained in each, as evidenced by their remains. In the first or *stone* period the use and working of metals was unknown, and stone, together also with the bones of animals, was employed for the fabrication of arms and other implements in the shape of knives, hatchets, &c. A parallel to the state of society as indicated by the remains of the stone period may be found in the condition of the South Sea Islanders at the present day. The next epoch in the advance of civilization is the *bronze* period, in which the art of working the metals had been discovered, but for general purposes only to the extent of reducing the ores of copper and tin, an art of comparatively easy attainment. From the combination of these two metals the beautiful bronze swords and spears and personal ornaments were formed which have been discovered in various parts of Great Britain and the Continent. The manufacture of gold and silver into ornaments, and more particularly of the former metal, which generally occurs in a native state, appears also to have been known and extensively practised during the bronze period. Many beautiful specimens of this description, exhumed from the ancient tumuli, where they had been deposited as sacred offerings alongside of the dead, are preserved in our museums. The third and last of the prehistoric epochs, the *iron* period, brings us down to the point where written history commences. The difficult and complicated art of fusing the ores of iron and forming it into various implements has at length been discovered, and a mighty change in consequence taken place in all that regards the useful arts of life.

The nomenclature of the stone, bronze, and iron periods was first devised by Mr. C. J. Thomsen, the son of a merchant in Copenhagen, who, in 1815, was appointed secretary of a royal commission for the preservation and collection of national antiquities. To his exertions the magnificent collection of the Royal Museum of Northern Antiquities at Copenhagen owes mainly its existence; and the above system, propounded by him, is now generally accepted. Of course we gain from it no information as to spaces of time; it only recognizes the fact that three successive stages may usually be observed. Accordingly the inhabitants of one region may have been in their stone period while those of another region were at

the same time in their iron period, as has been seen at the present day. Various societies or associations for the study of archæology have been formed in modern times, such as the Royal Archæological Institute of Great Britain and Ireland, and the British Archæological Association. See also ETHNOLOGY.

ARCHANGEL, a seaport, capital of the Russian government of same name, on the right bank of the Northern Dwina, about 20 miles above its mouth in the Arctic Ocean, and 670 miles north-east of St. Petersburg. It extends about 2 miles on a low flat along the river, and is ill built, mostly of wooden houses, arranged in two very irregular main streets, and numerous narrow lanes with wooden pavements. The most noticeable buildings are the churches, all Greek but an Anglican and two others that are Protestant, ecclesiastical seminary, two gymnasiums, navigation and engineering school, marine hospital, extensive stone bazaar, &c. There are ship-building yards, and a government dock-yard. The principal manufactures are linen, leather, canvas, cordage, and beer. Below the town the river divides into several branches and forms a number of islands, on one of which, called Sollenbole, is the harbour. It is not accessible to vessels drawing more than 17 feet, but the depth is being increased by dredging. Small craft ascend for 300 miles above the town, and thus furnish the means of a very important inland trade. The principal exports are oats, linseed, flax, tow, tallow, train-oil, mats, deals and battens, pitch and tar, and the imports coffee, spices, salt, woollens, hardware, &c. British vessels have the chief share in the trade. The port is closed for six months by ice. Railways have now been laid to connect the town and province with the rest of the empire. Archangel was founded in 1584, and was long the only port which Russia possessed. Pop. (1895), 17,194.—The province has an area of 331,490 square miles. The surface is nearly a continuous flat of desolate aspect, mostly covered with moors, morasses, pine-forests, and lakes. The chief crops, confined in a great measure to the south, and even there of very limited extent, are rye hemp, and flax. Cattle, sheep, and horses are reared. Pop. (1897), 426,200.

ARCHANGELICA. See ANGELICA.

ARCHBISHOP, a metropolitan prelate or bishop, having several suffragan bishops under him. In Roman Catholic countries the archiepiscopal chapters elect the archbishop, who is confirmed by the pope. The establishment of this dignity is to be traced up to an early period of Christianity, when the bishops and inferior clergy met in the capitals to deliberate on spiritual affairs, and the bishop of the city where the meeting was held presided. Certain honours were allowed him, the title of *metropolitan* particularly, on account of his residence. The synod of Antioch gave the archbishops, in the year 341, the superintendence over several dioceses, which were called their *province*, and a rank above the bishops of the same, who were obliged to ask their advice in some cases. By degrees their privileges increased, but of these the pope has retained many since the ninth century, so that only the following were left to the archbishops:—jurisdiction, in the first instance, over their suffragan bishops, in cases not of a criminal nature, and appellative jurisdiction from the bishop's courts; the right of convoking a provincial synod, which they were required to do at least once in every three years, and the right of presiding in the same; the care of enforcing the observance of the rules of the church, of remedying abuses, of distributing indulgences; the right of devolution, of having the cross carried before them in all parts of the province (if the pope himself or a *legatus a latere* is not present), and of wearing the archiepiscopal pallium (which see). In England there are two (Protestant) archbishops—those of Canterbury and York; the former styled *Primate of all England*, the latter *Primate of England*; but with regard to the exact distinctions between these appellations there is no little obscurity in the books of such as treat upon this subject. In ancient times the primacy of the Archbishop of Canterbury extended to Ireland as well as England. Hence he was styled a *patriarch*, had the titles of *orbis Britannici pontifex* and of *papa alterius orbis*. He is the first peer of the realm, having precedency before all dukes not of royal birth. He crowns the sovereign, whether king or queen. The first prelates in England are his officers. He can grant special licenses to marry at any time or place, and can confer all the older degrees conferred by the universities. He is addressed by the titles of *your grace* and *most reverend father in God*, and writes himself *by divine providence*, while the bishop only writes *by divine permission*. His jurisdiction extends over twenty-six dioceses. The first Archbishop of Canterbury was Augustine, appointed A.D. 598 by Ethelbert, when he was converted to Christianity. Next in dignity is the Archbishop of York, between whom and the Archbishop of Canterbury the Lord High-chancellor has precedence. He has nine dioceses under his jurisdiction. He crowns the queen-consort. The first Archbishop of York was Paulinus, appointed in 622. The incomes of these two prelates are £15,000 and £10,000 respectively. Scotland had two pre-Reformation archbishops—those of St. Andrews and Glasgow. Ireland had four, but the Protestant Episcopal Church has only two—Dublin and Armagh. In England there was no Roman Catholic archbishop after the reformation till Cardinal Wiseman became archbishop of Westminster in 1850. In Scotland there have been two since 1878. In Ireland the R. Catholic hierarchy has always existed in full, there being four archbishops.

ARCHDEACON, an ecclesiastical officer, who was at first only the chief among the deacons in a cathedral or metropolitan church in the fifth century, but who acquired an importance which raised him above the rank of presbyters, and placed him nearly on an equality with the bishops. The archdeacons have since been not mere assistants but representatives of the bishops in the dioceses and councils. By degrees the affairs of the bishop's jurisdiction, the superintendence of the clergy, the churches, convents, and ecclesiastical possessions, the right of visitation, the trial of heresies in the western bishoprics, came to be exercised by the archdeacons. Until the ninth century they were only delegates of the bishops; but they afterwards became independent officers of the church, with almost episcopal power, partly through the weakness and ignorance of their principals, partly through the division of the dioceses, which took place in the eighth century, into several smaller districts or archdeaconates, over which the archdeacons presided. In the eleventh and twelfth centuries they were acknowledged as the most influential prelates of the church, and at the summit of their power. On the establishment of the general episcopal tribunals under particular officers or general vicars, in the thirteenth century, the dignity of the archdeacons diminished, and their jurisdiction in most dioceses, in the fifteenth and sixteenth centuries, passed to the new courts. In the eighteenth century they were still regarded as dignitaries in some chapters, but now this office, principally on account of the contention about rank with the deans and other officers, is almost wholly abolished in the R. Catholic Church. In the chapters established again since the downfall of Napoleon it has not been revived. In the Greek Church, since the seventh century, there

have been no archdeacons, except one in the Greek imperial court at Constantinople. The Church of England, on the contrary, still has archdeacons, who are the deputies of the bishops and act as superintendents of districts.

ARCHELAUS, the name of several personages in ancient history, of whom we need mention only Archelaus the son of Herod the Great. This prince received from Augustus, with the title of Ethnarch, the sovereignty of Judea, Samaria, and Idumea. His reign is described as most tyrannical and bloody. The people at length accused him before Augustus, who, after hearing his defence, banished him in A.D. 10 to Vienne, in Gaul, where he died. To avoid the fury of Archelaus, Joseph and Mary, with the infant Jesus, retired to Nazareth.

ARCHER-FISH. See TOXOTES.

ARCHERY, the art of shooting with a bow and arrow. (See BOW.) This art, either as a means of offence in war or of subsistence and amusement in time of peace, may be traced in the history of almost every nation. The first notice of archery in the sacred writings occurs in Gen. xxi., where it is said that Ishmael 'dwelt in the wilderness, and became an archer'. It appears that the Jews did not excel so much in this art as some of the neighbouring nations, against whom they had to wage perpetual hostilities. The superiority of the Philistine archers seems, for instance, to be indicated in the battle of Gilboa. From the accounts given by Herodotus it would appear that the Scythians were superior to all other nations in the practice of archery, and that the Ethiopians and Egyptians also greatly excelled the Persians. Among the Greeks the bow and arrow appear to have been employed from the earliest times, being often mentioned by Homer. In later times the archers formed part of the light-armed troops, who were not held in such estimation as the hoplites, or heavy troops. There is no early account of bows having been used in the Roman armies. In the time of Scipio Africanus they were applied with great effect against the Numantines in Spain. They were chiefly carried by Cretans and other auxiliary troops in the Roman armies. In the middle ages the Goths, Vandals, and Huns gained their victories chiefly by the use of the same destructive weapons. The Swiss were famous archers. The English claim to be considered the best of modern archers, and their claims have scarcely been disputed. Edward III. was at great pains to provide bows and arrows. In the battle of Cressy his archers cut off the flower of the French nobility. The French had as many archers in the field as the English, but the former are understood to have used the cross-bow, which is not easily protected from the rain, and it is said their bows or their strings were so completely soaked as to be altogether unfit for use. The victory gained by the Black Prince at Poictiers, when the French king and the dauphin, and almost all the peers of France, were taken prisoners, was also ascribed to the archers, very few of whom fell, though the slaughter of the French was enormous. The battle of Agincourt, still more fatal to the French and more glorious to the English, was gained by the same mode of fighting. The advantages from time to time obtained over the Scots were chiefly owing to the strength and skill of the English archers. Robert the Bruce, at the battle of Bannockburn, dispersed the archers with his cavalry at the commencement of the conflict—a piece of tactics which contributed materially to the decisive victory of the Scotch. Bows and arrows rapidly gave way before firearms, though for more than two hundred years after firearms were introduced attempts were made by the English government from time to time to encourage the practice of archery. Charles I., in the fourth year of his reign, granted a commission under the great seal for enforcing the use of the long-bow; and though this was revoked a few years afterwards, another was granted in the year 1633 to two persons of the name of Meade, authorizing them to teach an invention for uniting the use of the bow and the pike. Ten years afterwards a precept was issued by the Earl of Essex, calling upon all well-affected persons to assist in raising a company of archers for the service of the king. Since that time, and indeed for some time before it, archery in the United Kingdom can claim only to be considered as a recreation. At the present day this weapon is still used by certain Asiatic nations, by many tribes of Africa, by the Indians of South America, &c. In 1813 and 1814 irregular troops, belonging to the Russian army, appeared in Paris armed with bows and arrows, and in the Crimean war some Turkish troops were so armed.

In some states of the atmosphere bows cannot be used with any effect; moisture not only impairs the elasticity of the bow but relaxes the strings, and soon renders them unfit for use. The direction and intensity of the wind seriously affect the aim of the archer. Except in a calm or in a very moderate wind the best marksman cannot shoot straight, and when the wind is very boisterous, especially if it either be opposite or a side wind, it is impracticable to shoot far. Another disadvantage under which the archers laboured was that when attacked in the night or in a fog, their weapons were comparatively useless.

In Great Britain a number of societies have contributed to preserve the practice of archery from falling into total disuse. The archers of Finsbury are now extinct, but their society was incorporated with the archers' division of the Artillery Company of London, founded by royal charter in the twenty-ninth year of the reign of Henry VIII. They were permitted to shoot not only at marks but also at birds, except pheasants or herons, and to wear dresses of any colour, except purple or scarlet. Among other companies still subsisting in England are the Woodmen of Arden, and the Royal Toxophilite Society. The Royal Company of Archers in Scotland is said to have arisen in the time of James I. The commissioners appointed by that prince to superintend the exercise of archery in different districts selected the most expert archers, and formed them into a company to act in the capacity of the king's principal bodyguards—a distinction which the royal company still claims within 7 miles of Edinburgh. In 1677 we find them recognized by an act of the privy-council as his Majesty's Company of Archers, and at the same time a king's prize, consisting of a piece of plate valued at £20 sterling, was ordered to be given annually to be shot for at their *weapon shawings*. In the year 1703 they obtained a royal charter from Queen Anne, confirming and multiplying their privileges. The royal prize, which had been withdrawn by King William soon after the Revolution, was restored during the reign of George III. This company, which includes a great proportion of the Scottish nobility and gentry, as well as a number of the citizens of Edinburgh, contains above 1000 members. It is part of the royal household in Scotland, and has a captain-general, four lieutenants-general, four majors-general, four ensigns-general, and about sixteen brigadiers-general, all gentlemen of rank or position. The royal prize already mentioned becomes the property of the winner; all the others are retained by the victors for a year, and are restored, each with a medal affixed having the name and crest of the winner engraven on it. The first is a silver arrow, given by the town of Musselburgh in 1603 or earlier.

The Kilwinning Archers, another ancient body (1688), kept up the pastime till 1870. The Grand National Archery Society is now the chief body of archers in England.

ARCHES, Court of, the chief and most ancient English ecclesiastical court, belonging to the archbishopric of Canterbury. It is so called from the church in London, commonly called *St. Mary le Bow*, or St. Mary of the Arches (*de arcubus*), where it was formerly held, this church being named Bow Church, from arches like bent bows forming a feature of it. The jurisdiction of this court extends over the province of Canterbury, and the judge in it (Dean of Arches) has similar jurisdiction for the province of York. The court has power to issue sentence of deprivation against a clerk in holy orders. An appeal, however, lies to the king.

ARCHIL, or Orchil, a colouring matter obtained from various kinds of lichens, the most important of which are the *Roccella tinctoria* and the *R. fuciformis*. The *Lecanora tartarea*, or cudbear, is another of the same nature; orchella-weed and dyer's-moss are common names for them. The *Roccella tinctoria*, or archil plant proper, is abundant in the Canaries and Cape Verde Islands, and in the Levant; the *R. fuciformis* also grows chiefly in warm climates, as the coasts of Africa (Angola) and Madagascar. Both are found in Britain, but in too small quantities to be of use, so that they have to be imported from the localities mentioned. Cudbear is imported in large quantities from Sweden. These lichens, which are chiefly collected from rocks near the sea, are cleaned and ground into a pulp with water, after which some ammoniacal liquor is added, when the colouring matter, red, violet, or purple, is evolved and falls to the bottom. The red colouring matter of *Lecanora tartarea* produces litmus when lime or an alkali is added. Archil has a beautiful violet colour. It is used for improving the tints of other dyes, as from its want of permanence it cannot be used alone.

ARCHILOCHUS of Paros, one of the earliest Ionian lyric poets, and the first Greek poet who composed iambic verses according to fixed rules. He flourished about 700 B.C. Between 710 and 700 B.C. he went from Paros to Thasos with a colony. While here he incurred the disgrace of losing his shield in battle. He gained the laurel crown at the Olympic games for a hymn to Hercules. Some say he was killed in battle; others, that he was assassinated. He wielded his satirical weapons with terrible effect. It is said that a fellow-citizen, Lycambes, promised him his daughter in marriage, but afterwards refused to fulfil his promise. The poet in revenge attacked the whole family with such virulence that the daughters of Lycambes hanged themselves for shame. With the same severity he attacked all his fellow-citizens who were unfortunate enough to displease him. His memory was honoured in all Greece so highly that he was placed beside Homer. His iambic poems were renowned for the force of the style, the liveliness of the metaphors, a sententious conciseness, elevated feeling, and a powerful but bitter spirit of satire. In other lyric poems of a higher character he was also considered as a model. All his works are lost but a few fragments, which may be found in Bergk's Poetæ Lyrici Græci.

ARCHIMANDRITE, in the Greek Church, an abbot or abbot-general, who has the superintendence of other abbots and convents (in the ancient Greek Church the convents were called *mandræ*). In Sicily the abbots were called thus because their convents were originally of Greek institution, and conformed to the rules of St. Basil. The general-abbots of the united Greeks in Poland, Galicia, Transylvania, Hungary, Slavonia, and Venice also bear this title.

ARCHIMEDES, one of the most celebrated among the ancient physicists and geometricians, was born at Syracuse, about 287 B.C. Though, according to some accounts, a relation and certainly a friend of King Hiero, he appears to have borne no public office, but to have devoted himself entirely to science. We cannot fully estimate his services to mathematics for want of an acquaintance with the previous state of science; still we know that he enriched it with discoveries of the highest importance, upon which the moderns have founded their admeasurements of curvilinear surfaces and solids. Euclid, in his Elements, considers only the relation of some of these magnitudes to each other, but does not compare them with surfaces and solids bounded by straight lines. Archimedes has developed the propositions necessary for effecting this comparison in his treatises on the sphere and cylinder, the spheroid and conoid, and in his work on the measure of the circle. He rose to still more abstruse considerations in his treatise on the spiral, which, however, even those acquainted with the subject can with difficulty comprehend. Archimedes is the only one among the ancients who has left us anything satisfactory on the theory of mechanics, and on hydrostatics. He first taught the principle, 'that a body immersed in a fluid loses as much in weight as the weight of an equal volume of the fluid,' and determined, by means of it, that an artist had fraudulently added too much alloy to a crown which King Hiero had ordered to be made of pure gold. He discovered the solution of this problem while bathing; and it is said to have caused him so much joy, that he hastened home from the bath undressed, and crying out, *Eureka! Eureka!* 'I have found it, I have found it!' Practical mechanics, also, received a great deal of attention from Archimedes. He is the inventor of the compound pulley, probably of the endless screw, &c. During the siege of Syracuse he devoted all his talents to the defence of his native country. Polybius, Livy, and Plutarch speak in detail with admiration, and probably with exaggeration, of the machines with which he repelled the attacks of the Romans. They make no mention of his having set on fire the enemy's fleet by burning-glasses,—a thing which is in itself very improbable, and related only in the later writings of Galen and Lucian. At the moment when the Romans, under Marcellus, gained possession of the city by assault, tradition relates that Archimedes was sitting in the market-place absorbed in thought, and contemplating some figures which he had drawn in the sand. To a Roman soldier, who addressed him, he is related to have cried out, 'Disturb not my circle!' but the rough warrior little heeded his request, and struck him down. The conquest of Syracuse is placed in the year 212 B.C. On his tombstone was placed a cylinder, with a sphere inscribed in it, thereby to immortalize his discovery of their mutual relation, on which he set particular value. Cicero, who was appointed quæstor over Sicily, found this monument in a thicket which concealed it. Of the works of Archimedes there are extant a treatise on Equiponderants and Centres of Gravity, in which the theory of the lever and other mechanical problems are treated; on the Quadrature of the Parabola; on the Sphere and Cylinder; on the Dimensions of the Circle; on Spirals; on Conoids and Spheroids; the Arenarius, a speculative treatise intended to refute the popular notion that the number of grains of sand on the sea-shore is infinite by showing that a definite number might be assigned to a quantity of grains sufficient to fill the sphere of the fixed stars, remarkable as containing an anticipation of the modern discovery of logarithms; on Floating Bodies; a treatise called Lemmata, of doubtful authenticity, on plane geometry.

A very complete and splendid edition of the works of Archimedes issued from the Clarendon Press, at Oxford, in 1792.

ARCHIMEDES SCREW, a machine for raising water, invented by Archimedes; it is also called the *spiral-pump*, and in Germany the *water-snail*. It may be formed either by wrapping a tube of stiff leather spirally round a solid cylinder, or by hollowing out the cylinder itself into a double or triple threaded screw, and inclosing it in a water-tight case. See HYDRAULICS.

ARCHIPELAGO, a term applied to any tract of sea abounding in small islands, and to the clusters of islands situated therein. The name is of Greek origin, being derived from the common prefix *archi-, arch-*, chief, principal, and *pelagus*, sea. It was originally applied to the Ægean, or sea between Greece and Asia Minor, to which it is still commonly applied. The Grecian Archipelago then is either this sea, or the islands lying scattered in it, between the coasts of Greece and Asia Minor. According to their situation they are divided into the islands belonging to Europe and to Asia. The former lie together almost in a circle, and for this reason have been called by the Greeks the *Cyclades;* the latter, being farther from one another, the *Sporades* ('scattered'). (See these articles, and also those under the headings HYDRA, NEGROPONT, SCIO, SAMOS, RHODES, CYPRUS, &c.) The Malay, Indian, or Eastern Archipelago, on the east of Asia, includes Borneo, Sumatra, and other large islands. See MALAY ARCHIPELAGO.

ARCHITECTURE, in the general sense of the word, is the art of erecting durable, commodious, healthful, and handsome buildings of all kinds, adapted to the purposes of the builder. The essential elementary parts of a building are those which contribute to its support, inclosure, and covering. Of these the most important are the foundation, the column, the wall, the lintel, the arch, the vault, the dome, and the roof. In laying the *foundation* of any building it is necessary to dig to a certain depth in the earth, to secure a solid basis below the reach of frost and common accidents. The most solid basis is rock, or gravel which has not been moved. Next to these are clay and sand, provided no other excavations have been made in the immediate neighbourhood. From this basis a stone wall is carried up to the surface of the ground, and constitutes the foundation. Where it is intended that the superstructure shall press unequally, as at its piers, chimneys, or columns, it is sometimes of use to occupy the space between the points of pressure by an inverted arch. This distributes the pressure equally, and prevents the foundation from springing between the different points. In loose or muddy situations it is always unsafe to build unless we can reach the solid bottom below. In salt marshes and flats this is done by depositing timbers, or driving wooden piles into the earth, and raising walls upon them. The preservative quality of the salt will keep these timbers unimpaired for a great length of time, and makes the foundation equally secure with one of brick or stone.

The simplest member in any building, though by no means an essential one to all, is the *column* or *pillar*. This perpendicular member, of very varied form, is intended simply for the support of some part of the superstructure. The principal force which a column has to resist is that of perpendicular pressure. In its shape the shaft of a column should not be exactly cylindrical, but, since the lower part must support the weight of the superior part, in addition to the weight which presses equally on the whole column, the thickness should gradually decrease from bottom to top. The outline of columns should be a little curved, so as to represent a portion of a very long spheroid or paraboloid, rather than of a cone. This figure is the joint result of two calculations, independent of beauty of appearance. One of these is, that the form best adapted for stability of base is that of a cone; the other is, that the figure which would be of equal strength throughout for supporting a superincumbent weight would be generated by the revolution of two parabolas round the axis of the column, the vertices of the curves being at its extremities. The swell of the shafts of columns was called *entasis* by the ancients. It has been ascertained that the columns of the Parthenon at Athens, which were commonly supposed to be straight, deviate about an inch from a straight line, and that their greatest swell is at about one-third of their height. Columns in the antique orders are usually made to diminish one-sixth or one-seventh of their diameter, and sometimes even one-fourth. The Gothic pillar is commonly of equal thickness throughout.

The *wall*, another elementary part of a building, may be considered as the lateral continuation of a column, answering the purpose both of inclosure and support. A wall must diminish as it rises, for the same reasons and in the same proportion as the column. It must diminish still more rapidly if it extends through several stories, supporting weights at different heights. A wall, to possess the greatest strength, must also consist of pieces, the upper and lower surfaces of which are horizontal and regular, not rounded nor oblique. The walls of most of the ancient structures which have stood to the present time are constructed in this manner, and frequently have their stones bound together with bolts and cramps of iron. The same method is adopted in such modern structures as are intended to possess great strength and durability, and in some cases the stones are even dovetailed together, as in the Eddystone and Bell Rock lighthouses. But many of our modern stone walls, for the sake of cheapness, have only one face of the stones squared, the inner half of the wall being completed with brick or rubble; so that they can, in reality, be considered only as brick or rubble walls faced with stone. Such walls are liable to become convex outwardly, from the difference in the shrinking of the cement. *Rubble* walls are made of rough, irregular stones laid in mortar. The stones should be broken, if possible, so as to produce horizontal surfaces. Modern brick walls are laid with great precision, and depend for firmness more upon their position than upon the strength of their cement. The bricks being laid in horizontal courses, and continually overlaying each other in *breaking joints*, the whole mass is strongly interwoven, and bound together. Wooden walls, composed of timbers covered with boards, are a common, but more perishable kind. They require to be constantly covered with a coating of a foreign substance, as paint or plaster, to preserve them from gradual decomposition. In some parts of France, and elsewhere, a kind of wall is made of earth, rendered compact by ramming it in moulds or cases. This method is called building in *pisé*, and is much more durable than the nature of the material would lead us to suppose. Walls of all kinds are greatly strengthened by angles and curves, also by projections, such as pilasters, chimneys, and buttresses. These projections serve to increase the breadth of the foundation, and are always made use of in large buildings, and in walls of considerable length.

The *lintel* or *beam* extends in a right line over a vacant space, from one column or wall to another. The strength of the lintel will be greater in proportion as its transverse vertical exceeds its horizontal diameter, the strength being always as the square

of the depth. The *floor* is the lateral continuation or connection of beams by means of a covering of boards.

The *arch* is a transverse member of a building, answering the same purpose as the lintel, but vastly exceeding it in strength. The *arch*, unlike the lintel, may consist of any number of constituent pieces without impairing its strength. It is, however, necessary that all the pieces should possess a uniform shape—the shape of a portion of a wedge—and that the joints, formed by the contact of their surfaces, should point towards a common centre. In this case no one portion of the arch can be displaced or forced inward; and the arch cannot be broken by any force which is not sufficient to crush the materials of which it is made. In arches made of common bricks, the sides of which are parallel, any *one* of the bricks might be forced inward were it not for the adhesion of the cement. Any *two* of the bricks, however, constitute a wedge, by the disposition of their mortar, and cannot collectively be forced inward. An arch of the proper form, when complete, is rendered stronger, instead of weaker, by the pressure of a considerable weight, provided this pressure be uniform. In course of building, however, it requires to be supported by a centering of the shape of its internal surface, until it is complete. The upper stone of an arch is called the *key-stone*, but is not more essential than any other. In regard to the shape of the arch, its most simple form is that of the semicircle. It is, however, very frequently a smaller arc of a circle, and still more frequently a portion of an ellipse. The simplest theory of an arch supporting itself only, is that of Dr. Hooke. The arch, when it has only its own weight to bear, may be considered as the inversion of a chain suspended at each end. The chain hangs in such a form that the weight of each link or portion is held in equilibrium by the result of two forces acting at its extremities; and these forces or tensions are produced, the one by the weight of the portion of the chain below the link, the other by the same weight increased by that of the link itself, both of them acting originally in a vertical direction. Now, supposing the chain inverted so as to constitute an arch of the same form and weight, the relative situations of the forces will be the same, only they will act in contrary directions, so that they are compounded in a similar manner, and balance each other on the same conditions. The arch thus formed is denominated a *catenary* arch. In common cases it differs but little from a circular arch of the extent of about one-third of a whole circle, and rising from the abutments with an obliquity of about 30° from a perpendicular. But though the catenary arch is the best form for supporting its own weight, and also all additional weight which presses in a vertical direction, it is not the best form to resist lateral pressure or pressure like that of fluids, acting equally in all directions. Thus the arches of bridges and similar structures, when covered with loose stones and earth, are pressed sideways, as well as vertically, in the same manner as if they supported a weight of fluid. In this case it is necessary that the arch should arise more perpendicularly from the abutment, and that its general figure should be that of the longitudinal segment of an ellipse. In small arches, in common buildings, where the disturbing force is not great, it is of little consequence what is the shape of the curve. The outlines may even be perfectly straight, as in the tier of bricks which we frequently see over a window. This is, strictly speaking, a real arch, provided the surfaces of the bricks tend towards a common centre. It is the weakest kind of arch, and a part of it is necessarily superfluous, since no greater portion can act in supporting a weight above it than can be included between two curved or arched lines. Besides the arches already mentioned, various others are in use. The *acute* or *lancet* arch, much used in Gothic architecture, is described usually from two centres outside the arch. It is a strong arch for supporting vertical pressure. The *rampant* arch is one in which the two ends spring from unequal heights. The *horse-shoe* or *Moorish* arch is described from one or more centres placed above the base line. In this arch the lower parts are in danger of being forced inward. The *ogee* arch is concavo-convex, and therefore fit only for ornament. In describing arches, the upper surface is called the *extrados*, and the inner the *intrados*. The *springing lines* are those where the intrados meets the abutments or supporting walls. The *span* is the distance from one springing line to the other. The wedge-shaped stones which form an arch are sometimes called *voussoirs* the uppermost being the key-stone. The part of a pier from which an arch springs is called the *impost*, and the curve formed by the upper side of the voussoirs the *archivolt*. It is necessary that the walls, abutments, and piers, on which arches are supported, should be so firm as to resist the lateral *thrust*, as well as vertical pressure, of the arch. It will at once be seen that the lateral or side pressure of an arch is very considerable, when we recollect that every stone or portion of the arch is a wedge, a part whose force tends to separate the abutments. For want of attention to this circumstance important mistakes have been committed, the strength of buildings materially impaired, and their ruin accelerated. In some cases the want of lateral firmness in the walls is compensated by a bar of iron stretched across the span of the arch and connecting the abutments, like the tie-beam of a roof. This is the case in the cathedral of Milan and some other large buildings. In an arcade or continuous series of arches it is only necessary that the outer supports of the terminal arches should be strong enough to resist horizontal pressure. In the intermediate arches the lateral force of each arch is counteracted by the opposing lateral force of the one contiguous to it. In bridges, however, where individual arches are liable to be destroyed by accident, it is desirable that each of the piers should possess sufficient horizontal strength to resist the lateral pressure of the adjoining arches.

The vault is the lateral continuation of an arch, serving to cover an area or passage and bearing the same relation to the arch that the walls do to the column. A simple vault is constructed on the principles of the arch and distributes its pressure equally along the walls or abutments. A complex or *groined* vault is made by two vaults intersecting each other, in which case the pressure is thrown upon springing points and is greatly increased at those points. The groined vault is common in Gothic architecture.

The *dome*, sometimes called *cupola*, is a concave covering to a building or part of it, and may be either a segment of a sphere, of a spheroid, or of any similar figure. When built of stone it is a very strong kind of structure, even more so than the arch, since the tendency of each part to fall is counteracted, not only by those above and below it, but also by those on each side. It is only necessary that the constituent pieces should have a common form and that this form should be somewhat like the frustum of a pyramid, so that, when placed in its situation, its four angles may point toward the centre or axis of the dome. During the erection of a dome it is not necessary that it should be supported by a centering until complete, as is done in the arch. Each circle of stones when laid is capable of supporting itself without aid from those above it. It follows that the dome may be left open at top without a

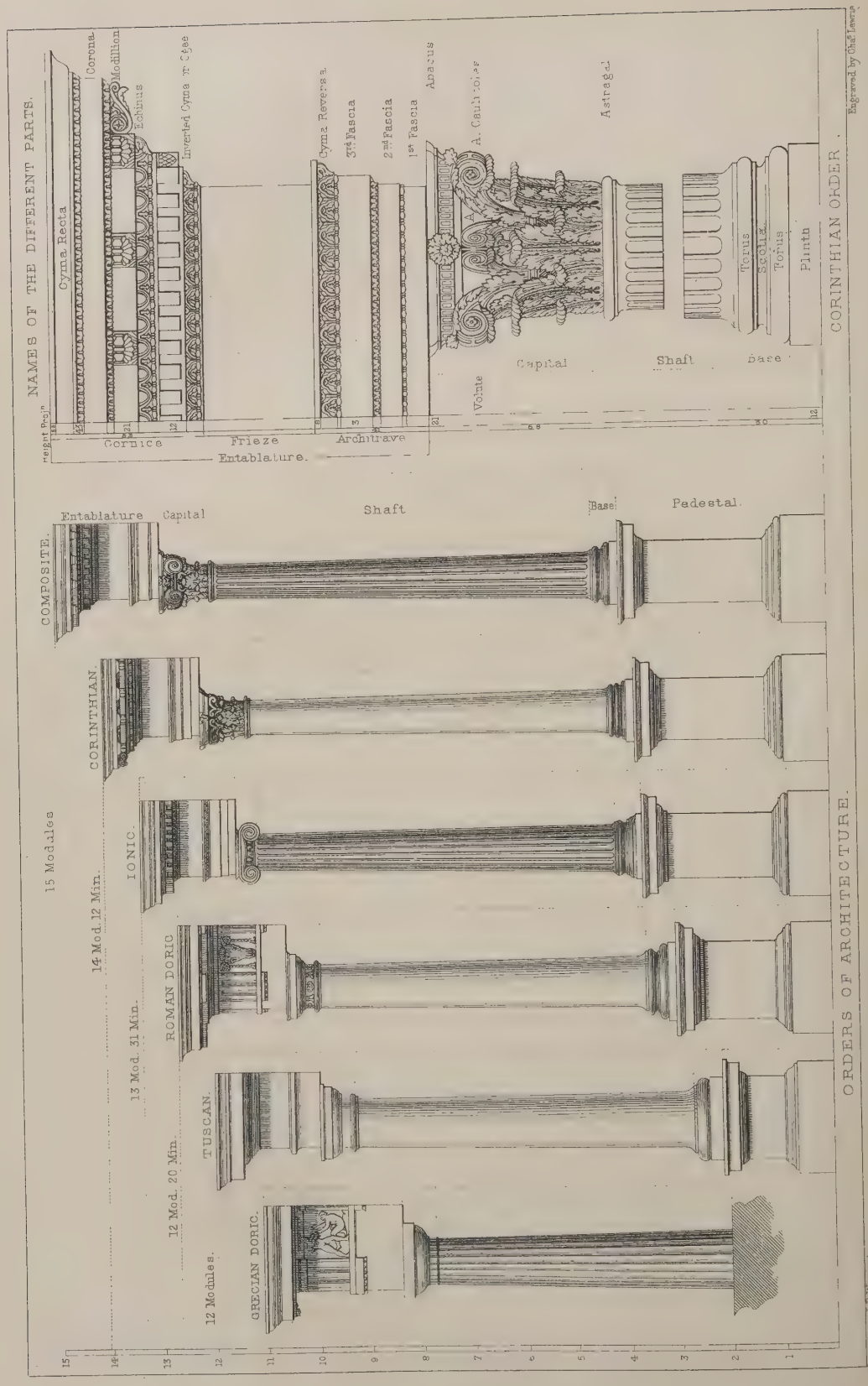
key-stone and yet be perfectly secure, in this respect being the reverse of the arch. The dome of the Pantheon at Rome has been always open at top, and yet has stood unimpaired for nearly 2000 years. The upper circle of stones, though apparently the weakest, is nevertheless often made to support the additional weight of a lantern or tower above it. In several of the largest cathedrals there are two domes, one within the other, which contribute their joint support to the lantern, which rests upon the top. In these buildings the dome rests upon a circular wall, which is supported in its turn by arches upon massive pillars or piers. This construction is called building upon *pendentives*, and gives open space and room for passage beneath the dome. The remarks which have been made in regard to the abutments of the arch apply equally to the walls immediately supporting a dome. They must be of sufficient thickness and solidity to resist the lateral pressure of the dome, which is very great. The walls of the Roman Pantheon are of great depth and solidity. In order that a dome in itself should be perfectly secure its lower parts must not be too nearly vertical, since in this case they partake of the nature of perpendicular walls and are acted upon by the spreading force of the parts above them. The dome of St. Paul's church in London and some others of similar construction are bound with chains or hoops of iron to prevent them from spreading at bottom. Domes which are made of wood depend in part for their strength on their internal carpentry.

The *roof* is the most common and cheap method of covering buildings to protect them from rain and other effects of the weather. It is sometimes flat, but more frequently sloping in its shape. The flat or platform roof is the least advantageous for shedding rain, and is seldom used in northern countries. The *pent* roof, consisting of two sloping sides meeting at top, is the most common form. These roofs are made steepest in cold climates, where they are liable to be loaded with snow. Where the four sides of the roof all slope towards each other it is denominated a *hipped* roof, and where there are two portions to the roof of different slope, it is a *curb* or *mansard* roof. In modern times roofs are generally made of wood, though frequently covered with incombustible materials. The internal structure or carpentry of roofs is a subject of considerable mechanical contrivance. (See CARPENTRY.) Roofs are generally covered with slates or earthen tiles, or with sheets of lead, copper, zinc, or tinned iron. Slates are preferable to tiles, being lighter and absorbing less moisture. Metallic sheets are chiefly used for flat roofs, wooden domes, and curved and angular surfaces, which require a flexible material to cover them, or have not a sufficient pitch to shed the rain from slates or shingles. Various artificial compositions are occasionally used to cover roofs, the most common of which are mixtures of tar with lime, and sometimes with sand and gravel.

STYLES OF ARCHITECTURE.—The architecture of different countries has been characterized by peculiarities in external form and in modes of construction. These peculiarities among ancient nations were so distinct that their structures may be identified even in a state of ruin; and the origin and era of each may be conjectured with tolerable accuracy. Before we proceed to describe architectural objects it is necessary to explain certain terms which are used to denote their different constituent portions. The architectural *orders* will be spoken of under the head of the Grecian and Roman styles, but their component parts ought previously to be understood.—The front or *façade* of a building, made after the ancient models, or any portion of it, may present three parts, occupying different heights. The *pedestal* is the lower part, usually supporting a column. The single pedestal is wanting in most antique structures, and its place supplied by a *stylobate*. This stylobate is either a platform with steps, or a continuous pedestal, supporting a row of columns. The lower part of a finished pedestal is called the *plinth;*[1] the middle part is the *die*, and the upper part the *cornice* of the pedestal or *surbase*.—The *column* is the middle part, situated upon the pedestal or stylobate. It is commonly detached from the wall, but is sometimes buried in it for half its diameter, and is then said to be *engaged*. *Pilasters* are square or flat columns attached to walls. The lower part of a column when distinct is called the *base;* the middle, or longest part, is the *shaft;* and the upper, or ornamented part, is the *capital*. The height of columns is measured in diameters of the column itself, taken always at the base.—The *entablature* is the horizontal continuous portion, which rests upon the top of a row of columns. The lower part of the entablature is called the *architrave* or *epistylium*. The middle part is the *frieze*, which, from its usually containing sculpture, was called *zoophorus* by the ancients. The upper or projecting part is the *cornice*.—A *pediment* is the triangular face, produced by the extremity of a roof. The middle, or flat portion, inclosed by the cornice of the pediment, is called the *tympanum*. Pedestals for statues, erected on the summit and extremities of a pediment, are called *acroteria*. An *attic* is an upper part of a building, terminated at top by a horizontal line instead of a pediment.—The different *mouldings* in architecture are described from their sections or from the profile which they present when cut across. Of these, the *torus* is a convex moulding, the section of which is a semicircle or nearly so. The *astragal* is like the torus but smaller. The *ovolo* is convex, but its outline is only the quarter of a circle. The *echinus* resembles the ovolo, but its outline is ovoid, not circular. The *scotia* is a deep concave moulding. The *cavetto* is also concave and occupying but a quarter of a circle. The *cymatium* is an undulated moulding, of which the upper part is concave and the lower convex. The *ogee* or *talon* is an inverted cymatium. The *fillet* is a small square or flat band used to separate the mouldings.[2]—In architectural measurement a *diameter* means the width of a column at the base. A *module* is half a diameter. A *minute* is a sixtieth part of a diameter. (See our plate for illustrations of the terms above mentioned.) In representing edifices by drawings architects make use of the *plan*, *elevation*, *section*, and *perspective*. The *plan* is a map or design of a horizontal surface, showing the ichnographic projection or ground-work, with the relative position of walls, columns, doors, &c. The *elevation* is the orthographic projection of a front or vertical surface; this being represented, not as it is actually seen in perspective, but as it would appear if seen from an infinite distance. The *section* shows the interior of a building, supposing the part in front of an intersecting plane to be removed. The *perspective* shows the building as it actually appears to the eye, subject to the laws of scenographic perspective. The three former are used by architects for purposes of admeasurement; the latter is used also by painters, and is capable of bringing more than one side into the same view as the eye actually perceives them. We come now to the different styles of architecture.

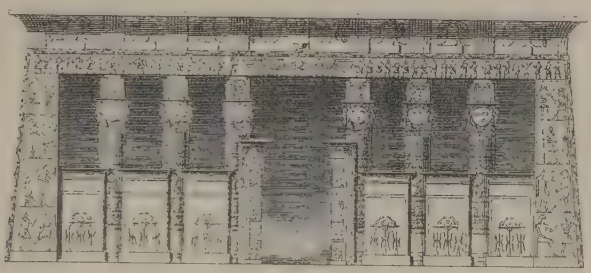
[1] The name *plinth*, in its general sense, is applied to any square projecting basis, such as those at the bottom of walls and under the base of columns.

[2] By a singular mixture of derivations the Greek, Latin, Italian, French, and English languages are laid under contribution for the technical terms of architecture.


NAMES OF THE DIFFERENT PARTS.
Cyma Recta
Corona
Modillion
Echinus
Inverted Cyma or Cyée
Cyma Reversa
3rd Fascia
2nd Fascia
1st Fascia
Abacus
A. Caulicolus
Astragal
Volute
Torus
Scotia
Torus
Plinth
Capital
Shaft
Base
Cornice
Frieze
Architrave
Entablature.
CORINTHIAN ORDER.
Engraved by Chas Lewers
COMPOSITE.
Entablature
Capital
Shaft
Base
Pedestal.
CORINTHIAN.
IONIC.
ROMAN DORIC.
TUSCAN.
GRECIAN DORIC.
15 Modules
14 Mod. 12 Min.
13 Mod. 31 Min.
12 Mod. 20 Min.
12 Modules.
ORDERS OF ARCHITECTURE.
Drawn by J. H. Warring.

OBELISKS LUXOR EGYPT

ROCK TEMPLE ELLORA INDIA



TEMPLE OF TENTYRA EGYPT

THE ERECTHEUM ATHENS

TEMPLE OF JUPITER AT OLYMPIA

THE PARTHENON, PROPYLÆA, &c ATHENS

I. *Egyptian Style.*—In ancient Egypt a style of building prevailed more massive and substantial than any which has succeeded it. The elementary features of the architecture of the Egyptians were chiefly as follows: 1. Their walls were of great thickness and sloping on the outside. This feature is supposed to have been derived from the mud walls, mounds, and caverns of their ancestors. 2. The roofs and covered ways were flat or without pediments, and composed of blocks of stone reaching from one wall or column to another. The principle of the arch, although known to them, was seldom, if ever, employed by them. 3. Their columns were numerous, close, short, and very thick, being sometimes 10 or 12 feet in diameter. They were generally without bases, and had a great variety of capitals, from a simple square block, ornamented with hieroglyphics or faces, to an elaborate composition of palm-leaves not unlike the Corinthian capital. (See this illustrated in the view of the Portico of the Great Temple at Tentyra, given in plate.) 4. They used a sort of concave entablature or cornice, composed of vertical flutings or leaves, and a winged globe in the centre. 5. Pyramids, well known for their prodigious size; and obelisks, composed of a single stone, often exceeding 70 feet in height, are structures peculiarly Egyptian. (See examples of obelisks in the view of the entrance to Luxor given in plate.) 6. Statues of enormous size, sphinxes carved in stone, and sculptures in outline of fabulous deities and animals, with innumerable hieroglyphics, are the decorative objects which belong to this style of architecture. The architecture of the ancient Hindus appears to have been derived from the same original ideas as the Egyptian. The most remarkable relics of this people are their subterraneous temples, of vast size and elaborate workmanship, carved out of the solid rock, such as those at Elephanta, Ellora, and Salsette. (See plate.) The general plan of these rock-cut temples is that of a central aisle or nave, with a semicircular vaulted roof, terminating in a kind of semicircular apse and surrounded by a narrow corridor, which, being separated by pillars from the main area, forms two side aisles. In Indian buildings (properly so called) the pyramidal form prevails, and they are generally overloaded with an excess of florid ornaments.

II. *The Chinese Style.*—The ancient Tatars and wandering shepherds of Asia appear to have lived from time immemorial in *tents*, a kind of habitation adapted to their nomad life. The Chinese have made the tent the elementary feature of their architecture; and of their style anyone may form an idea by inspecting the figures which are depicted upon common China ware. Chinese roofs are concave on the upper side, as if made of canvas instead of wood. A Chinese portico is not unlike the awnings spread over shop windows in summer time. The *Verandah*, sometimes copied in dwelling-houses, is a structure of this sort. The Chinese towers and pagodas have concave roofs, like awnings, projecting over their several stories. The lightness of the style used by the Chinese leads them to build with wood, sometimes with brick, and seldom with stone.

III. *The Grecian Style.*—Grecian architecture, from which have been derived the most splendid structures of later ages, had its origin in the wooden hut or cabin, formed of posts set in the earth, and covered with transverse poles and rafters. Its beginnings were very simple, being little more than imitations in stone of the original posts and beams. By degrees these were modified and decorated, so as to give rise to the distinction of what are now called the *orders* of architecture.—By the architectural orders are understood certain modes of proportioning and decorating the column and its entablature. They were in use during the best days of Greece and Rome, for a period of six or seven centuries. They were lost sight of in the dark ages, and again revived by the Italians, at the time of the restoration of letters. The Greeks had three orders, called the *Doric*, *Ionic*, and *Corinthian*. These were adopted and modified by the Romans, who also added two others, called the *Tuscan* and *Composite*. (See the plate.)—The *Doric* is the earliest and most massive order of the Greeks. It is known by its large columns with plain capitals, its *triglyphs* resembling the ends of beams, and its *mutules* corresponding to those of rafters. The column, in the examples at Athens, is about six diameters in height. In the older examples, as those at Pæstum, it is but four or five. The shaft had no base, but stood directly on the stylobate. It had twenty flutings, which were superficial, and separated by angular edges. The perpendicular outline was nearly straight. The Doric capital was plain, being formed of a few *annulets* or rings, a large *echinus*, and a flat stone at top called the *abacus*. The architrave was plain; the frieze was intersected by the oblong projections called *triglyphs*, divided into three parts by vertical furrows, and ornamented beneath by *guttæ* or drops. The spaces between the triglyphs were called *metopes*, and commonly contained sculptures. The sculptures representing Centaurs and Lapithæ, brought by Lord Elgin to London, were metopes of the Parthenon or temple of Minerva at Athens. The cornice of the Doric order consisted of a few large mouldings, having on their under side a series of square, sloping projections, resembling the ends of rafters, and called *mutules*. These were placed over both triglyphs and metopes, and were ornamented on their under side with circular *guttæ*. The best specimens of the Doric order are found in the Parthenon and the temple of Jupiter at Olympia (see plate), the Propylæa, and the temple of Theseus at Athens.—The *Ionic* is a lighter order than the Doric, its column being eight or nine diameters in height. It had a base often composed of a *torus*, a *scotia*, and a second *torus*, with intervening fillets. This is called the *Attic* base. Others were used in different parts of Greece. The shaft had twenty-four or more flutings, which were narrow, as deep as a semicircle, and separated by a fillet or square edge. The capital of this order consisted of two parallel double scrolls, called *volutes*, occupying opposite sides, and supporting an abacus, which was nearly square, but moulded at its edges. When a column made the angle of an edifice, its volutes were placed, not upon opposite, but on contiguous sides, each fronting outward. In this case the volutes interfered with each other at the corner, and were obliged to assume a diagonal direction. The Ionic entablature consisted of an architrave and frieze, which were continuous or unbroken, and a cornice of various successive mouldings, at the lower part of which was often a row of *dentels* or square teeth. Athenian examples of the Ionic order are the temple of Erechtheus (see plate), and the temple on the Ilissus, which was standing in Stuart's time, but is now destroyed.—The *Corinthian* was the lightest and most decorated of the Grecian orders. Its base resembled that of the Ionic, but was more complicated. The shaft was often ten diameters in height, and was fluted like the Ionic. The capital was shaped like an inverted bell, and covered on the outside with two rows of leaves of the acanthus plant, above which were eight pairs of small volutes. Its abacus was moulded and concave on its sides, and truncated at the corners, with a flower on the centre of each side. The entablature of the Corinthian order resembled that of the Ionic, but was more complicated and ornamented, and had under the cornice a row of large, oblong

projections, bearing a leaf or scroll on their under side, and called *modillions*. No vestiges of this order are now found in the remains of Corinth, and the most legitimate example at Athens is in the beautiful choragic monument of Lysicrates. The Corinthian order was much employed in the subsequent structures of Rome and its colonies.—The Greeks sometimes departed so far from the strict use of the orders as to introduce statues in the place of columns to support the entablature. Statues of slaves, heroes, and gods appear to have been employed occasionally for this purpose. The principal specimen of this kind of architecture which remains is in a portico called the *Pandroseum*, attached to the temple of Erechtheus at Athens, in which statues of Carian females, called *Caryatides*, are substituted for columns. (See the plate.) One of these statues is now in the British Museum, London.

Grecian temple.—The most remarkable public edifices of the Greeks were their temples. Their form was commonly that of a parallelogram, having a colonnade without, and a walled *cell* within. The cell was usually without windows, receiving its light from apertures at the end, and sometimes from a lateral opening in the roof. The part of the colonnade which formed the front portico was called the *pronaos*, and that which formed the back part the *posticum*. The colonnade was subject to great variety in the number and disposition of its columns, from which Vitruvius has described seven different species of temples. These were, 1. The temple with *antæ*. In this the front was composed of pilasters, called *antæ*, on the sides, and two columns in the middle. 2. The *prostyle*. This had a row of columns at one end only. 3. The *amphiprostyle*, having a row of columns at each end. 4. The *peripteral* temple. This was surrounded by a single row of columns, having six in front and in rear, and eleven, counting the angular columns, on each side. 5. The *dipteral*, with a double row of columns all round the cell, the front consisting of eight. 6. The *pseudo-dipteral* differs from the dipteral in having a single row of columns on the sides, at the same distance from the cell as if the temple had been dipteral. 7. The *hypæthral* temple had the centre of its roof open to the sky. It was colonnaded without, like the dipteral, but had ten columns in front. It had also an internal colonnade, called *peristyle*, on both sides of the open space, and composed of two stories or colonnades, one above the other. Temples, especially small ones, were sometimes made of a circular form. (See plate.) When these were wholly open, or without a cell, they were called *monopteral* temples. When there was a circular cell within the colonnade they were called *peripteral*.

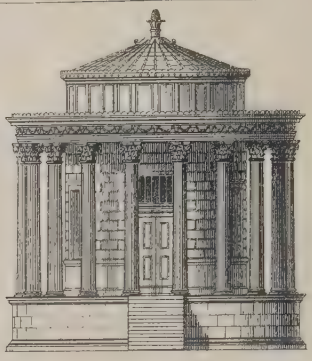
The *theatre* of the Greeks, which was adapted by the Romans, was semicircular on one side and square on the other. The semicircular part, which contained the audience, was filled with concentric seats, ascending from the centre to the outside. In the middle, or bottom, was a semicircular floor, called the *orchestra*. The opposite, or oblong part, contained the actors. Within this was erected, in front of the audience, a wall, ornamented with columns and sculpture, called the *scena*. The stage or floor between this part and the orchestra was called the *proscenium*. Upon this floor was often erected a movable wooden stage, called by the Romans *pulpitum*. The ancient theatre was open to the sky, but a temporary awning was erected to shelter the audience from the sun and rain.

Grecian architecture is considered to have been in its greatest perfection in the age of Pericles and Phidias (460–430 B.C.). The sculpture of this period is admitted to have been superior to that of any other age; and although architecture is a more arbitrary art than sculpture, yet it is natural to conclude that the state of things which gave birth to excellence in the one, must have produced a corresponding power of conceiving sublimity and beauty in the other. Grecian architecture was in general distinguished by simplicity of structure, fewness of parts, absence of arches, lowness of pediments and roofs, and by decorative curves, the outline of which was a spiral line or conic section, and not a circular arc as afterwards adopted by the Romans.

IV. *Roman Style.*—Roman architecture had its origin in copies of the Greek models. All the Grecian orders were introduced into Rome, and variously modified. Their number was augmented by the addition of two new orders—the Tuscan and the Composite. The *Tuscan* order, derived from the ancient Etruscans, is not unlike the Doric deprived of its triglyphs and mutules. It had a simple base, containing one torus. Its column was seven diameters in height, with an astragal below the capital. Its entablature, somewhat like the Ionic, consisted of plain running surfaces. There is no vestige of this order among ancient ruins, and the modern examples of it are taken from the descriptions of Vitruvius. The Romans modified the Doric order by increasing the height of its column to eight diameters. Instead of the echinus, which formed the Grecian capital, they employed the ovolo, with an astragal and neck below it. They placed triglyphs over the centre of columns, not at the corners, and used horizontal mutules, or introduced foreign ornaments in their stead. The theatre of Marcellus at Rome presents an example of the Roman Doric. The Romans diminished the size of the volutes in the Ionic order. They also introduced a kind of Ionic capital, in which there were four pairs of diagonal volutes, instead of two pairs of parallel ones. This they usually added to parts of some other capital; but at the present day it is often used alone, under the name of *modern* Ionic. The *Composite* order was made by the Romans out of the Corinthian, simply by combining its capital with that of the diagonal or modern Ionic. Its best example is found in the fine Arch of Titus at Rome. The favourite order, however, in Rome and its colonies was the Corinthian, and it is this order which prevails among the ruins, not only of Rome, but of Nismes, Pola, Palmyra, and Baalbec. The temples of the Romans sometimes resembled those of the Greeks, but often differed from them. The *Pantheon*, which is the most perfectly preserved temple of the Augustan age, is a circular building, lighted only from an aperture in the dome, and having a Corinthian portico in front. The *amphitheatre* differed from the theatre in being a completely circular or rather elliptical building, filled on all sides with ascending seats for spectators, and leaving only the central space, called the *arena*, for the combatants and public shows. The Coliseum is a stupendous structure of this kind. The *aqueducts* were stone canals, supported on massive arcades, and conveying large streams of water for the supply of cities. The *triumphal arches* were commonly solid, oblong structures, ornamented with sculptures, and open with lofty arches for passengers below. (See plate.) The *basilica* of the Romans was a hall of justice, used also as an exchange, or place of meeting for merchants. It was lined on the inside with colonnades of two stories, or with two tiers of columns, one over the other. The earliest Christian churches at Rome were sometimes called *basilicæ*, from their possessing a similar internal colonnade. The monumental *pillars* were towers in the shape of a column on a pedestal, bearing a statue on the summit, which was approached by a spiral staircase within. Sometimes, however, the

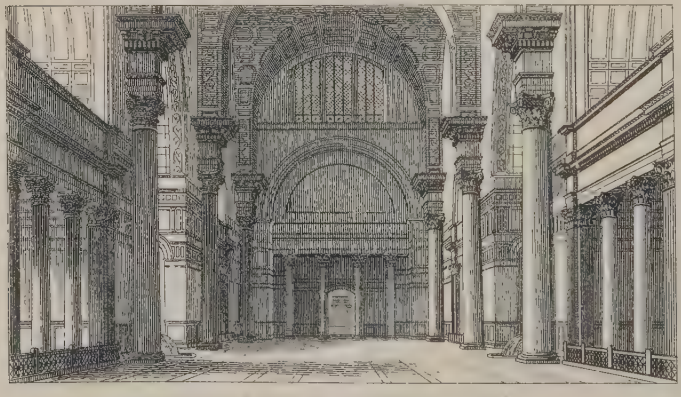
ARCH OF TITUS, ROME.

MONUMENT OF LYSICRATES

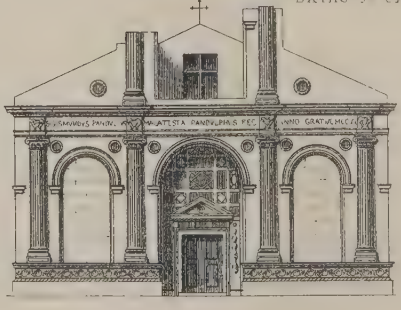


TEMPLE OF VESTA, TIVOLI

RESTORATION OF THE FORUM, ROME

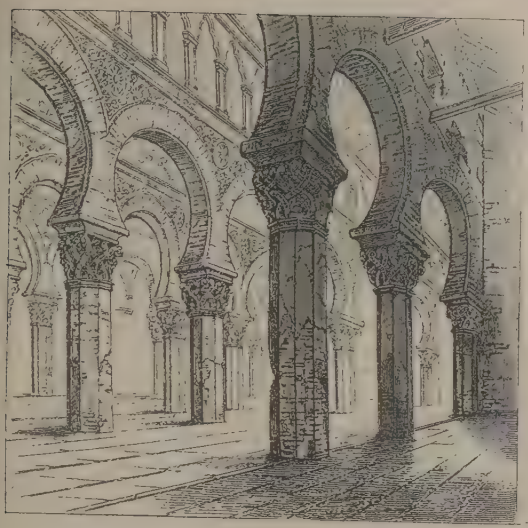


BATHS OF CARACALLA, ROME (Restored)

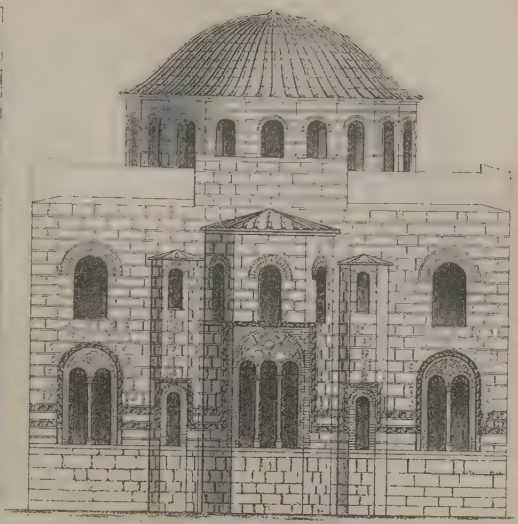


CHURCH AT RIMINI

PALAZZO PANDOLFINI, FLORENCE.



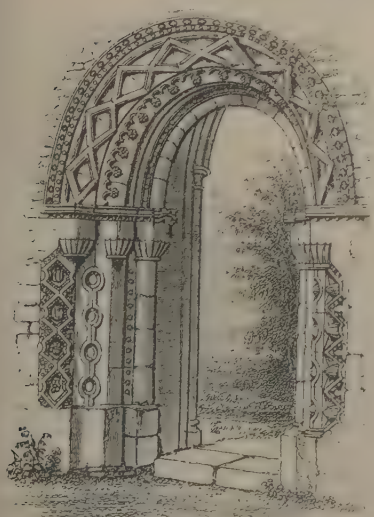
MOORISH.
Santa Maria la Blanca, Toledo.



BYZANTINE.
Church of Panagia Lycodemo, Athens.

ROMANESQUE.
San Appolinare ad Classem, Ravenna.

SAXON.
Tower of Earls Barton Church



NORMAN.
Kirkham Priory, Yorkshire.

EARLY ENGLISH GOTHIC.
Salisbury Cathedral, Wiltshire. Height 404 Ft. Length 216 ft.

column was solid. The *thermæ*, or baths were vast structures in which multitudes of people could bathe at once. They were supplied with warm and cold water, and fitted up with numerous rooms for purposes of exercise and recreation. (See plate.) In several particulars the Roman copies differed from the Greek models on which they were founded. The stylobate or substructure, among the Greeks, was usually a plain succession of platforms, constituting an equal access of steps to all sides of the building. Among the Romans it became an elevated structure, like a continued pedestal, accessible by steps only at one end. The spiral curve of the Greeks was exchanged for the geometrical circular arc, as exemplified in the substitution of the ovolo for the echinus in the Doric capital. The changes in the orders have been already mentioned. After the period of Hadrian Roman architecture is considered to have been on the decline. Among the marks of a deteriorated style, introduced in the later periods, were columns with pedestals, columns supporting arches, convex friezes, entablatures squared so as to represent the continuation of the columns, pedestals for statues projecting from the sides of columns, niches covered with little pediments, &c.

V. *Byzantine.*—The name Byzantine is properly applied, according to Mr. Fergusson, 'only to that form of art invented in Constantinople after its virtual separation from the Western Empire, and practised by the Greek Church during the whole of the middle ages'. The church of St. Sophia at Constantinople offers the most typical specimen of the Byzantine style of architecture. Its fundamental principle was an application of the Roman arch. Massive pillars connected by bold arches bore the great dome which spanned the chief area and was the most striking feature of the building. To this other areas were joined, and were covered generally by semi-domes or other modifications of the arch. These were sometimes supported directly by the main pillars; sometimes fine arcades of smaller pillars in several rows above each other were interposed between them and the latter. The ground-plan was frequently that of an octagon; in later times that of a Greek cross, with the great dome rising at the intersection. In many of the details oriental influence is manifest. New forms of capitals were invented, and arches were often made to rest on a square and somewhat tapering capital.

VI. *Romanesque Style.*—After the dismemberment of the Roman Empire the arts degenerated so far that a custom became prevalent of erecting new buildings with the fragments of old ones, which were dilapidated and torn down for the purpose. This gave rise to an irregular style of building, which continued to be imitated, especially in Italy, during the dark ages. It consisted of Grecian and Roman details, combined under new forms, and piled up into structures wholly unlike the antique originals. Hence the names *Romanesque* and *Græco-Gothic* architecture have been given to it. It frequently contained arches upon columns, forming successive arcades, which were accumulated above each other to a great height. The effect was sometimes imposing. The cathedral and Leaning Tower at Pisa, and the church of St. Mark at Venice, are cited as among the best specimens of this style. The Saxon architecture, used anciently in England, has some things in common with this style. Two examples of this will be found in the doorways shown in our plate. Two types of this style of architecture, the Lombard and the Norman Romanesque, form important phases of art. The Lombard, which prevailed in North Italy and South Germany from the eighth or ninth to the thirteenth century, may be classed under the head of the Græco-Gothic style; but the Norman Romanesque is marked by characteristics more especially local, and presents a just feeling for proportion, a comparative simplicity of treatment, and the germs of changes towards the Pointed style, not to be remarked in an equal degree elsewhere. It flourished especially in Normandy and England, from the eleventh to the thirteenth century, including what is termed the Semi-Norman period, in which the round arch is often replaced by the pointed, as at Christ Church, Oxford, circa A.D. 1120, and St. Cross, near Winchester, circa 1136. The finest examples of pure Norman are to be seen in the Abbaye aux Hommes at Caen. It is of a noble style of architecture, to appreciate which the reader is referred to Pugin and Le Keux's fine work on Normandy.

VII. *Saracenic* or *Moorish Style.*—The edifices erected by the Moors and Saracens in Spain, Egypt, and Turkey are distinguished, among other things, by a peculiar form of the arch. This is a curve, constituting more than half of a circle or ellipse. This construction of the arch is unphilosophical, and comparatively insecure. A similar peculiarity exists in the domes of the oriental mosques, which are sometimes large segments of a sphere, appearing as if inflated, and at other times concavo-convex in their outline, as in the mosque of Achmet. The *minaret* is a tall, slender tower peculiar to Turkish architecture. A peculiar flowery decoration, called *arabesque*, is common in the Moorish buildings of Europe and Africa. Some distinguish the Arabian style, formed after the Greek, and the Moorish, formed after the remains of the Roman buildings in Spain, which seems a good division. With regard to the latter, nobody can behold the remains of the Moorish buildings at Granada, the Alhambra for instance, Seville, and Cordova without admiration. The Arabian style is particularly distinguished by light decorations and splendour.

VIII. *Gothic* or *Pointed Style.*—The style now called Gothic exhibits much grandeur and splendour, and at the same time excellent technical execution; yet it is only in modern times that its great master-pieces, as the minster of Strasburg, the cathedral of Cologne, the minster at York, &c., have begun to be justly appreciated and understood. Very great attention is at present paid to the study of this style. Its striking characteristics are its pointed arches, its pinnacles and spires, its large buttresses, clustered pillars, vaulted roofs, profusion of ornament, the general predominance of the perpendicular over the horizontal, and in the whole, its lofty, bold character. As the greatest capabilities of Gothic architecture have been best displayed in ecclesiastical edifices, it is necessary to understand the usual plan and construction of these buildings. A church or cathedral is commonly built in the form of a cross, having a tower, lantern, or spire erected at the place of intersection. The part of the cross situated toward the west is called the *nave*. The opposite or eastern part is called the *choir*, and within this is the *chancel*. The transverse portion, forming the arms of the cross, is called the *transept*. Any high building erected above the roof is called a *steeple*; if square-topped it is a *tower*; if long and acute, a *spire*; and if short and light, a *lantern*. Towers of great height in proportion to their diameter are called *turrets*. The walls of Gothic churches are supported on the outside by lateral projections, extending from top to bottom, at the corners and between the windows. These are called *buttresses*, and they are rendered necessary to prevent the walls from spreading under the enormous weight of the roofs. On the tops of the buttresses and elsewhere are slender pyramidal structures or spires called *pinnacles*. These are

ornamented on their sides with rows of projections appearing like leaves or buds, which are named *crockets*. The summit or upper edge of a wall, if straight, is called a *parapet;* if indented, a *battlement*. Gothic windows were commonly crowned with an acute arch. They were long and narrow, or if wide were divided into perpendicular lights by *mullions*. The lateral spaces on the upper and outer side of the arch are called *spandrils*, and the ornaments in the top, collectively taken, are the *tracery*. An *oriel* or *bay window* is a projecting window; a *wheel* or *rose window* is large and circular. The Gothic style is divided into four principal epochs—the Early Pointed, or general style of the thirteenth century; the Decorated, or style of the fourteenth century; the Perpendicular, practised during the fifteenth and early part of the sixteenth centuries; and the Tudor, or general style of the sixteenth century. Broadly speaking, the acute-pointed or lancet-shaped arch is distinctive of the first period; the roofs also are of very high pitch; the supports are central shafts, with disengaged colonnettes surrounding them; the foliage is bold and deeply cut, and ornament generally judiciously applied. The equilateral arch is more general in the Decorated style; as its name denotes, ornament becomes more generally applied; the windows are filled in with much flowing tracery, and the columns and shafts are conjoined. The Perpendicular takes its name from the general vertical tendency of its tracery; the general proportions are elongated, the number of members increased, and the arch mouldings often run continuously around apertures without impost or capital; superabundant ornament characterizes it; and the windows are furnished with *transoms* or cross-bars as well as *mullions*. All these characteristics are continued and exaggerated in the fourth period or Tudor style, which is distinguished, moreover, by the use of flat-headed and ogee-formed apertures. This style lasted in England up to the seventeenth century, being gradually displaced by that branch of the Renaissance or revival of ancient Roman architecture which is known amongst us as the Elizabethan style, and which is perhaps more purely our national style than any other which can be named, and is eminently adapted for country mansions. The Renaissance itself commenced in Italy during the fifteenth century under Brunelleschi and Alberti, who were the first to study the ancient remains attentively and to organize their researches into a system, which finally was shaped into the Italian style, practised in Italy and throughout Europe generally in the sixteenth and seventeenth centuries. The church at Rimini shown in our plate is an example of Alberti; the Palazzo Pandolfini in same plate is in a later Renaissance style, the design being by Raphael.

In edifices erected at the present day the Grecian or the Gothic outlines are commonly employed to the exclusion of those of other styles. Modern dwelling-houses have necessarily a style of their own as far as stories and apartments and windows and chimneys can give them one. No more of the styles of former ages can be applied to them than what may be called the unessential and decorative parts. In general the Grecian style, as handed down by Rome and modified by the Italian architects of the Renaissance, from its right angles and straight entablatures, is more convenient, and fits better with the distribution of our common edifices, than the pointed and irregular Gothic. The expense also is generally less, especially if anything like thorough and genuine Gothic is attempted. But the occasional introduction of the Gothic outline and the partial employment of its ornaments has undoubtedly an agreeable effect both in public and private edifices; and we are indebted to it, among other things, for the spire, a structure exclusively Gothic, which, though often misplaced, has become an object of general approbation and a pleasing landmark to cities and villages. The dome, on the other hand, is one of the glories of classic style of architecture, and the round arch and column its greatest beauty.

History of Architecture. The first habitations of men were such as nature afforded, with but little labour on the part of the occupant, and sufficient to satisfy his simple wants—huts, grottoes, and tents. But as soon as men rose above the state of rude nature, formed societies, and cultivated the soil, they began to build more durable and more commodious habitations. They wrought the materials with more care, fitted the parts together more closely and neatly, prepared bricks of clay and earth, which they first dried in the air and afterwards baked by the fire; they smoothed stones, and joined them at first without cement. After they had learned to build houses they began to erect temples for their gods, who first dwelt with them in caverns, huts, and tents. These temples were larger and more splendid than the habitations of men. Thus architecture became a fine art, which was first displayed on the temples, afterwards on the habitations of princes and public buildings, and at last, with the progress of wealth and refinement, became a universal want of society. The palace appeared in the place of the hut of reeds and clay; the rough trunk was transformed into a lofty column, and the natural vault of a cavern into the splendid Pantheon. Colonnades, halls, courts, and various ornaments now appeared. Stieglitz contends that the fundamental forms of the ancient Egyptian and Grecian architecture probably originated in structures of stone and not from those of wood, as Hirt maintains in his History of the Architecture of the Ancients. The earliest buildings of the Indians were modelled on the structure of caverns. To the most ancient nations known to us among whom architecture had made some progress belong the Babylonians, whose most celebrated buildings were the temple of Belus, the palace and the hanging gardens of Semiramis; the Assyrians, whose capital, Nineveh, was rich in splendid buildings; the Phœnicians, whose cities, Sidon, Tyre, Aradus, and Sarepta, were adorned with equal magnificence; the Israelites, whose temple was considered as a wonder of architecture; and the Syrians and the Philistines. Few architectural monuments of these nations have, however, been transmitted to us. But we find subterranean temples of the Hindus at a later period hewn out of the solid rock upon the islands Elephanta and Salsette. Of the Persian architecture the ruins of Persepolis still remain; of the Egyptian, obelisks, pyramids, temples, palaces, sepulchres; of the Etruscan, some sepulchres and portions of city walls. The character of this older architecture was immovable solidity, gigantic proportions, and a prodigal splendour, which excited admiration, astonishment, and awe.

The Greeks were the first who passed from the rough and gigantic to a noble simplicity and dignity. The Doric order of columns characterizes this first period. The greatest masters, Phidias, Ictinus, Callicrates, and others, encouraged and supported by Pericles, emulated each other as soon as peace at home and abroad was restored. The beautiful temple of Minerva was erected upon the Acropolis of Athens, also the Propylæum, the Odeum, and other splendid buildings. (See plate.) An equal taste for the arts arose in the Peloponnesus and in Asia Minor. A high degree of simplicity was united with majestic grandeur and elegance of form. The beauties of architecture were displayed not only in temples, but also in theatres, odeums, colonnades, market-

places, and gymnasia. The Ionic and Corinthian columns were added to the Doric. At the end of the Peloponnesian war the perfection of architecture was gone. A noble simplicity had given place to excess of ornament. This was the character of the art at the time of Alexander, who founded a number of new cities. But a strict regularity hitherto prevailed in the midst of this splendid decoration. After the death of Alexander (323 B.C.) the increasing love of gaudy splendour hastened the decline of the art more and more. In Greece it was afterwards but little cultivated, and in the edifices of the Seleucidæ in Asia, and of the Ptolemies in Egypt, an impure taste prevailed. The Romans had no temples, or similar public edifices, equal to the Grecian masterpieces, although they had early applied their industry to other objects of architecture, namely, to aqueducts and sewers. The capitol and the temple of the capitoline Jupiter were erected by Etruscan architects. But soon after the second Punic war (say 200 B.C.) they became acquainted with the Greeks. Sulla was the first who introduced the Grecian architecture to Rome; and he, as also Marius and Cæsar, erected large temples in this and in other cities. Under Augustus the art first rose to the perfection of which it was capable at that time. He encouraged the Greek artists, who had exchanged their country for Rome, and erected, partly from policy, many splendid works of architecture. Agrippa built temples (the Pantheon), aqueducts, and theatres. Private habitations were adorned with columns and marble. Splendid villas were built, of which the rich Romans often possessed several. Their interiors were adorned with works of art obtained from Greece, or executed by Greek artists. The walls were covered with thin marble plates, or were painted, and divided into panels, in the middle of which were represented mythological or historical subjects. They were also surrounded with the most elegant borders. These borders were ornamented with what we call *grotesques*. Almost all the successors of Augustus embellished the city more or less, erected splendid palaces and temples, and adorned, like Hadrian, even the conquered countries with them. At this period the Roman forum was to be seen in its greatest splendour. (See plate.) Constantine the Great transferred the imperial residence from Rome to Constantinople, so that nothing more was done for the embellishment of Rome. But at the time when the Romans received the art from the Greeks it had already lost, among the latter, its perfection and purity. In Rome it rose, indeed, in a short time to its former height, but soon degenerated, with the continually increasing magnificence of the emperors, into extravagance of ornament. About this time the Roman or Composite column originated, which was employed in temples and splendid buildings. In the time of Nero, whose golden palace is celebrated, the exterior and interior of the buildings were profusely adorned. Hadrian, who was an encourager of artists, was not able to restore a noble and simple taste in architecture. Instead of imitating the beautiful models already existing, the endeavour in his time was to invent new styles, and to embellish the beautiful more and more. Now originated the many curved and twisted ornaments, the high pedestal under the columns, the numerous bas-reliefs on the exterior of buildings, the coupled columns, the reduced pilasters behind the columns, the small columns between larger ones, the rounded and cut pediments, and the concave friezes. Thus the art was practised from the time of Vespasian to the time of the Antonines. Works were produced in this period which may still be considered as master-pieces, but which are deficient in the refined and noble style of the Greeks. In the provinces taste became still more corrupt. Architecture continued to decline after the Antonines; more ornaments were continually added, which is proved particularly by the *Arch of the Goldsmiths*, so called, in Rome. Alexander Severus, indeed, himself a connoisseur, did something for its improvement, but it rapidly declined under his successors. The buildings of this time are either overcharged with mean and trifling ornaments, as those of Palmyra, erected about 260 A.D., or they border on the rude, like those of Rome erected under Constantine. Little was done under the following emperors for the embellishment of the cities, on account of the continually disturbed state of the empire. Justinian, however, built much. His principal edifice was the church of St. Sophia at Constantinople, a master-piece of the Byzantine style.

The beautiful works of ancient architecture were almost entirely destroyed by the Goths, Vandals, and other barbarians, in Italy, Spain, Greece, Asia, and Africa; and whatever escaped destruction remained in neglect, or their ruin was consummated by the hatred of the Christians. Theodoric, king of the Ostrogoths, a friend of the arts, endeavoured to preserve and restore the ancient buildings, and even erected several new ones, the ruins of which are still to be seen in Ravenna and Verona. We may consider this period as the era of the origin of modern art. We see a new style taking the place of classical architecture, and eventually extending as far as the conquests of the Goths, through Italy, France, Spain, Portugal, a part of Germany, and even into England. But the buildings erected during the Lombard dominion in Italy (from 568), and all the monastic architecture of that time, still bear witness to their attachment to old Roman traditions, and as a class they are generally described as Lombard-Romanesque. This Lombard style of architecture was employed at an early period in Pavia, the chief city of the Lombard kingdom, in the erection of the churches of St. John and St. Michael; at Parma, in the church of St. John; at Bergamo, in the church of St. Julia; in the chapel of Altenotting, in Bavaria; in the castle of Nürnberg; in the Scottish church at Ratisbon; &c. The architects driven from Constantinople (Byzantium) were the first who combined with it the use of the Ionic pedestals and columns, provided with capitals formed according to their own taste, among which were twisted ones, the leaves of which appear as though blown by the wind. In this Græco-Gothic, or Byzantine style, as some writers have called it, were erected the cathedrals of Bamberg, Worms, and Mainz, also the church of San Miniato al Monte, near Florence, and the most ancient part of the minster of Strasburg. Cupolas were afterwards added, as used in the East. In the Byzantine style pure were erected, besides the church of St. Sophia in Constantinople, and numerous others in the East, the church of St. Mark at Venice, and the church of San Vitale in Ravenna. As already mentioned the Norman-Romanesque has been distinguished by certain characteristics from the Lombard-Romanesque. It prevailed chiefly in Normandy and England. The conquests of the Moors introduced a fresh style of architecture into Europe after the eighth century—the Moorish or Saracenic. The Mussulman conquerors had at that time almost exclusive possession of the arts and sciences. Saracen architects rose in Greece, Italy, Sicily, and other countries; after some time many Christians, particularly Greeks, joined them, and formed together a fraternity, who kept secret the rules of their art, and whose members recognized one another by particular signs. (See FREEMASONRY.) The Moorish architecture appears in all its splendour in the ancient palace of the Mohammedan monarchs

at Granada, called the Alhambra, which resembles more a fairy palace than a work of human hands. As already mentioned, the distinguishing feature of the Moorish architecture is the form of the arch.

The Germans were unacquainted with architecture until the time of Charlemagne. He introduced from Italy to Germany the Byzantine and Romanesque styles, then common in the West and the East. Afterwards the Arabian architecture had some influence upon that of the western nations, and thus originated a mixed style, which maintained itself until the middle of the thirteenth century. Then began the modern Gothic style, which we may also call the *romantic*, since it was formed by the romantic spirit of the middle ages. Growing up in France, England, and Germany, it attained its perfection in the cathedrals of Laon and Paris, of Salisbury and Wells, in the towers of the cathedral of Strasburg, in the cathedral of Cologne, in the church of St. Stephen in Vienna, the cathedral of Erfurt, the church of St. Sebaldus in Nuremberg, the church of St. Elizabeth in Marburg, &c. In the Gothic architecture the lofty columns, always united in groups; the splendidly vaulted roofs, the great flying-buttresses, the geometrical tracery, the general richness of decoration, and the grandeur and regularity of the whole, are in the highest degree impressive.

The Italians disengaged themselves by little and little from the Byzantine taste. Even in the eleventh century Byzantine architects built the church of St. Mark in Venice. But in the twelfth century a German architect named William (Guglielmo), and in the thirteenth Jacob, with the surname Lapo, who died in 1262, and his pupil or son Arnolfo, are mentioned as having built churches and convents in Tuscany. The modern Gothic style passed from the churches and abbeys to the castles, palaces, bridges, and city gates, many of which were built in this manner; for example, in Milan, sixteen city gates of marble, and several new palaces; in Padua, seven bridges and three new palaces; in Genoa, two docks and a splendid aqueduct; and the town of Asti, in 1280, almost entirely. Architecture was continually improving in Italy, particularly in the fourteenth century. Galeazzo Visconti finished the great bridge at Pavia, and built a palace which had not then its equal. About the same time the famous cathedral of Milan was erected. The marquises of Este erected handsome edifices at Ferrara. In Bologna the great church of St. Petronius was begun, and in Florence the famous tower of the cathedral. The fifteenth century, in which the study of ancient architecture was revived, was greatly distinguished. The dukes of Ferrara, Borso, and Ercole of Este, were active patrons of architecture. Duke Francesco Sforza embellished Milan with the ducal palace, the castle, the great hospital, and other edifices. Ludovico Sforza erected the buildings of the university at Pavia. The popes adorned Rome, and Lorenzo de' Medici, Florence, with splendid buildings. The artists returned to the monuments of antiquity, and studied their beautiful forms and just proportions. The most illustrious architects of this time were Filippo Brunelleschi, who built at Florence the dome of the cathedral, the church S. Spirito, and the palace Pitti, besides many edifices at Milan, Pisa, Pesaro, and Mantua; Leon Battista Alberti, who wrote about the same time on architecture; Bramante, who commenced the building of St. Peter's; Michael Angelo Buonarotti, who erected its magnificent dome; and Fra Giocondo, who built much in France, and afterwards directed, with Raphael, the building of the church of St. Peter's. These were followed by others who proceeded in their spirit—Peruzzi, Palladio, Scamozzi, Serlio, Barozzi, known by the name of Vignola. They are the founders of the existing taste in architecture. That, however, they studied their art in those works of antiquity which had already deviated from the early purity and elevated grandeur is evident in many of their buildings. Thus a new period in architecture had begun in Italy. Italian masters and young artists sent to Italy introduced the Roman taste into foreign countries, which gradually supplanted the Gothic.

Since that time architecture has experienced different destinies in different countries. It has risen and declined at different periods. Laudable attempts have been made in recent times to advance it to its true perfection, and though we cannot affirm that they have succeeded everywhere, yet many works of much originality and merit have been built of late years throughout Europe. France and Germany especially have produced architects in whose works are to be seen skilful design and a very refined taste. In Great Britain the revival of Gothic architecture has been fully accomplished, owing to certain religious and romantic ideas prevalent at this day; and many buildings, in which at least there has been a lavish expenditure of money, attest its vitality, especially among the ecclesiastical parties. Modern building in iron and glass has also taken extension. Railway architecture presents a style in many respects original and meritorious; but the great monuments of art which will remain to future ages as proofs of the national taste are the grand bridges, viaducts, &c., which are characteristic of the age; and when other puny works, whose only merit is an abundance of ornament, shall have crumbled into dust, these others will remain as worthy monuments of the power and taste of the British nation.

ARCHITRAVE, the part of an entablature which rests immediately on the heads of the columns, being the lowest of its three principal divisions; also the ornamental moulding running round the exterior curve of an arch, and the moulded enrichment on the faces of the jambs and lintels of a door or window. See ARCHITECTURE—Grecian style.

ARCHIVES. See RECORDS.

ARCHONS, the highest magistrates in Athens. There was for a long period only one archon, who possessed for life all the power and dignity of a king, and was chosen from the royal race of Codrus. In 752 B.C. a change was introduced, and the tenure of the archonship was restricted to ten years, the person appointed being still a member of the royal race. In 714 the latter condition was abolished, and the archonship thrown open to all the Eupatrids or nobles; and in 683 a still greater change was introduced, the office being now made annual, and its functions distributed among a body of nine. The reforms of Solon threw the archonship open to all who possessed a certain amount of property, whether noble by birth or not; and in 477 Aristides made it accessible to all Athenian citizens, without distinction. Up till 508 the mode of election was by suffrage of the nobles; election by lot was then introduced, and the person elected had to undergo a scrutiny before the senate and before the Agora, in order to show that his ancestors had been citizens for three generations, and had to swear to obey the laws. The first of the nine archons was called 'the archon', and sometimes the Archon Eponymus, because he gave his name to the year in all public records. He had the care of minors and orphans, and had to superintend some of the festivals. The second archon was called the King Archon. Upon him chiefly devolved the care of the religious concerns of the people, in connection with which he had to act as prosecutor of murderers and offenders against religion. The third archon had the name of Polemarch.

and was originally intrusted with the superintendence of military matters, though in later times his duties were chiefly confined to the protection and superintendence of the resident aliens. The rest of the archons were called Thesmothetæ, and exercised a general supervision over the laws of the state.

ARCHYTAS, an ancient Greek, a native of Tarentum, a famous Pythagorean philosopher, renowned also as a truly wise man, a great mathematician, statesman, and general. He was the contemporary of Plato, and flourished about 400–365 B.C., but the dates of his birth and death are unknown. The invention of the analytic method in mathematics is ascribed to him, as well as the solution of many geometrical and mechanical problems. He constructed various machines and automata, among the most celebrated of which was his flying pigeon. Plato is said to have borrowed some of his opinions from Archytas, and Aristotle also is said to have been indebted to him for the idea of his categories and some of his ethical opinions. These opinions, however, appear to depend on spurious writings, the real remains of Archytas being of inconsiderable value. Horace mentions him in one of his poems (Carm. i. 28) as having been drowned on the coast of Apulia.

ARC LIGHT. See ELECTRIC LIGHTING.

ARCIS-SUR-AUBE, a small town of France, department of Aube on the river Aube. It is the birthplace of Danton, to whom a monument was erected here in 1886. In 1814 a battle was fought here between Napoleon and the allies in which the latter, with a much superior force, had the advantage, and afterwards marched to Paris. Pop. 2841.

ARCO, a town of Austria, in Tirol, not far from the Lake of Garda, on account of its situation and mild climate a favourite winter resort of invalids. Pop. 3782.

ARCOLE, a village in North Italy, in the province, and 15 miles south-east of the town of Verona, on the left bank of the Alpone, celebrated for the battles of Nov. 15, 16, and 17, 1796, fought between the French under Bonaparte and the Austrians in which the latter were defeated with great slaughter.

ARÇON, JEAN CLAUDE ELÉONORE D', French military engineer, was born in 1733, at Pontarlier, and was designed for the church, but his father, a lawyer, yielded to the decided inclination of his son for military science. He was received into the military school at Mézières, 1754, and the following year into the corps of engineers. In the Seven Years' War he highly distinguished himself, particularly at the defence of Cassel in 1761. In 1774 he was employed in drawing a map of the Jura and the Vosges, and to expedite the labour he invented a new mode of shading. He wrote much, and in all his writings we find a richness of ideas and traces of decided genius. In 1780 he invented the floating batteries for the attack of Gibraltar, which, however, were destroyed by the red-hot shot of the besieged. At the invasion of Holland under Dumouriez (in 1793) he took several places, including Breda. He then went into retirement, where he wrote his Considérations Militaires et Politiques sur les Fortifications. The first consul placed him in the senate in 1799, and he died July 1, 1800.

ARCONA, or ARKONA, the north-eastern promontory of the island Rügen, in the Baltic. Here is an old circular fort, in which was formerly situated the temple of the Wendish god Swantewit, who was highly venerated by all the Slavonians in North Germany, and whose worship King Waldemar I. of Denmark put an end to by burning the temple and the image of the god in 1168. The country is delightful and fertile. The shores are precipitous and very picturesque. Travellers frequently visit the island, which, on account of its seclusion, abounds with old and marvellous tales.

ARCOS DE LA FRONTERA, a city of Spain in Andalusia, in the province of Cadiz, 30 miles east by north from Cadiz, on the right bank of the Guadalete, which is here crossed by a stone bridge. The sandstone rock on which the town, in form of a bow, is placed, rises 570 feet above the level of the river, by which it is washed on three sides. The houses are mean-looking; the streets paved, but generally steep and narrow; and the ancient walls and defences are in a ruinous state. On the highest part of the rock stands the castle of the dukes of Arcos, partly in ruins. Pop. (1887), 16,199; (1900), 13,926.

ARCOT, two districts of India, within the Presidency of Madras. NORTH ARCOT is bounded north by Cuddapah and Nellor, east by Chingalpat, south by South Arcot and Salem, west by the territory of Mysor; area, 7256 square miles. The country is partly flat and partly mountainous, where it approaches the Eastern Ghâts. The hills are mostly bare, but the valleys are fertile. Copper and iron ore and other minerals are abundant. The Palar is the principal river. Grain, cotton, sugar-cane, and indigo are among the principal crops. The town of Arcot is in this district. See below. Pop. (1901) 2,208,391.—SOUTH ARCOT is bounded north by North Arcot and Chingalpat, east by the French territory of Pondicherry and the Bay of Bengal, on the south by Tanjor and Trichinopoly, on the west by Salem; area, 4873 square miles. The coast is low and sandy and mostly level, except in the west, where ranges of hills rise between it and the district of Salem. Tigers and other wild animals abound in the jungles of the western district. The Coleroon River separates it from Trichinopoly on the south. Two irrigating canals from this river supply the district. The other chief rivers are the South Ponnar and Vellar. It has two seaports, Cuddalor and Porto Novo. Pop. (1901), 2,350,365.

ARCOT, a town of India, in the Madras Presidency, in the district of North Arcot. It is situated on the south bank of the Palar, about 70 miles west by south of Madras, near the railway from Madras to the west coast. Though interesting historically, it is a declining place, with little industry or trade. The town is modern, built by the Mohammedans. It contains handsome mosques, a nabob's palace in ruins, and the remains of an extensive fort. Arcot played an important part in the wars which resulted in the ascendency of the British in India. About 1712 Saadut Ulla Khan, the first who took the title of Nawab or Nabob of the Carnatic, made Arcot the seat of government. The nabobs were engaged in occasional hostilities with the French from 1746 till 1749, when Arcot was taken by Chunda Sahib, an ally of the French. It was taken by Clive, 31st August, 1751, and afterwards defended by him against Rajah Sahib. It afterwards fell into the hands of the French, and was recaptured in 1760 by Colonel Coote. It was taken by Hyder Ali in 1781, and finally recovered by the British in 1801. Pop. about 12,000.

ARCTIC, an epithet given to the north pole, or the pole raised above our horizon, from the proximity of the constellation of the Bear, in Greek called *arktos*. The *Arctic circle* is an imaginary circle on the globe, parallel to the equator, and 23° 28′ distant from the north pole, from whence its name. This and its opposite, the *antarctic*, are called the two polar circles. Within these circles the sun does not set during a part of the year, and during a corresponding part does not rise.

ARCTIC EXPEDITIONS. See NORTH POLAR EXPEDITIONS.

ARCTIC OCEAN, in its widest sense, is that portion of the ocean which extends from the Arctic circle (lat. 66° 32′ N.) to the north pole, or more restrictedly from about 70° of N. lat. Assuming the former limit, the Arctic Ocean is found entering deeply, in the form of gulfs, bays, &c., into the northern parts of the continents of Europe, Asia, and America. The principal of these indentations are the White Sea in Europe; Kara Sea, Gulfs of Obi and Yenisei in Siberia; and Baffin's Bay in North America. It is united to the Pacific by Behring's (or Bering's) Strait, and to the Atlantic by a wide stretch of sea extending from Greenland on the west to Norway on the east. Among the principal islands of the Arctic Ocean are Greenland (at last proved to be an island), and east of Greenland the extensive group known under the name of Spitzbergen, the small island of Jan Mayen, and Iceland. West of Greenland, and divided from it by Davis Strait and Baffin's Bay, there are a considerable number of islands of great size but little interest. North of Europe are the islands of Nova Zembla; and north from these, Francis Joseph Land, an archipelago as yet imperfectly known. The water of the Arctic Ocean is extremely pure, shells being distinctly visible at a great depth; it also presents rapid transitions of colour, chiefly from ultramarine to olive-green, the latter produced by myriads of minute animals, belonging, for the most part, to the classes Mollusca and Cœlenterata.

ARCTIC REGIONS, the regions round the north pole, and extending from the pole on all sides to the Arctic circle in lat. 66° 32′ N. The Arctic or North Polar circle just touches the northern headlands of Iceland; cuts off the southern and narrowest portion of Greenland; crosses Fox's Strait north of Hudson's Bay, whence it goes over the American continent to Behring's Strait. Thence it runs to Obdorsk at the mouth of the Obi; then, crossing Northern Russia, the White Sea, and the Scandinavian Peninsula, returns to Iceland.

The most important facts now ascertained respecting the climate of the Arctic regions are, that the main line of extreme cold extends across the Polar Sea from the meridian of 90° W. to that of 130° E., reaching much farther on the Asiatic than on the American side, so that the winter temperature of Yakutsk (lat. 62° 2′) is 7° Fahr. lower than that of Rensselaer Harbour, in Smith's Sound (lat. 78° 37′). But the American limit of cold oscillates much less than the Asiatic, the summer temperature at Rensselaer Harbour being but 62°, while at Yakutsk it is 95° Fahr. above that of winter. This difference is due to the absorption of summer heat by the comparatively dry plains of Siberia, while on the North American continent the numerous lakes and inlets moderate the climate throughout the year. To this it may, perhaps, be added that Greenland, owing to its peculiar constitution and position, is to North America a source of refrigeration which has no counterpart in the eastern continent. This circumstance, and the humid atmosphere maintained by the numerous lakes, somewhat moderates the severity of the cold, but at the same time renders it more constant.

Many formerly held to the belief in the existence of an open polar sea about the north pole. But this belief was never supported by any evidence. Ice is nearly constant everywhere between Spitzbergen and the southern point of Greenland. This is called the main northern ice. East of Spitzbergen and near Nova Zembla, the sea is always beset, if not completely barred, by ice. In Baffin's Bay, and thence westward to Behring's Strait, our numerous expeditions have had a perpetual struggle with ice. The expedition of 1875–76 under Captain Nares, members of which reached a point 30 miles farther north than had ever previously been attained, proceeding by way of Baffin's Bay and Smith's Sound, found no indications of an open polar sea. On the contrary, the explorers found north of 82° 27′ a sea consisting of one unbroken sheet of old ice of immense thickness. Nansen also found abundance of ice in the far northern tract of sea crossed by him. Lastly, Commander Peary, who in 1909 actually reached the pole by going northwards through Smith's Sound disproved the existence of any open sea about the pole.

It seems certain that a current sets into the polar basin along the coasts of Norway and Lapland. It is probably the effect of prevalent south-west winds, though some call it a branch of the Gulf Stream. There is also a strong current running in at Behring's Strait. On the other hand, along the eastern coast of Greenland and in Baffin's Bay the movement is generally southwards. In the numerous channels between Baffin's Bay and Behring's Strait the tides are regular but feeble; indeed, it seems possible to trace across Barrow's Straits the line of neutralized or no tide, and this, there is reason to suspect, is also the line of comparatively permanent ice.

Valuable minerals, fossils, &c., have been discovered within the Arctic regions. In the archipelago north of the American continent excellent coal frequently occurs. The mineral cryolite is mined in Greenland and carried to the United States. (See CRYOLITE.) Among other fossils, the remains of large saurians are found in the Lias, which extends widely over the northern archipelago, and ammonites collected in abundance prove that in lat. 73° N. there was once a tropical temperature. The group of islands opposite the mouth of the Lena, in lat. 73°, are little more than accumulations of fossil remains carried down by the river, and are annually visited for the purpose of digging fossil ivory. The only arborescent plants in Greenland are dwarf birches, willows, and berberries; thyme and angelica in sheltered spots alone give perfume. The English expedition of 1875–76 found twenty or thirty species of phanerogamous plants between lat. 82° and 83°. From Churchill River on the western side of Hudson's Bay (lat. 53°), the line limiting the forest runs constantly to the north of west till it reaches Norton Sound, a little south of Behring's Strait, larch and poplar making their appearance as we go west. In Siberia, where the summer heat is greater, woods flourish to a much higher latitude within the polar circle. In the Scandinavian Peninsula the red pine reaches lat. 69°, the Scotch fir 70°, the birch 71°. Animal life is by no means deficient within the polar circle. Species indeed are few, but the individuals extremely numerous. The proof of this is to be found in the immense number of skins of fur-bearing animals, eider-ducks, seals, walrus, &c., annually supplied to commerce. Recent expeditions have found the usual arctic quadrupeds and birds as far north as the land extended. How far north the cetaceans reach is doubtful.

Notwithstanding this apparent abundance, the human being has in general a severe struggle for subsistence beyond the 64th parallel N. lat., though traces of Esquimaux have been found as far north as 81° 52′. The Esquimaux who inhabit Greenland and the extreme north of America have a hard life of it, often pressed, and not seldom cut off, by famine. Under their rigorous skies the resources derivable from the surrounding abundance of animal life can only support a handful of men. Even in Siberia, where the reindeer trained to the sledge, and the great rivers from south to north frozen throughout the winter, add so greatly to the facilities of intercourse

or emigration, whole communities are frequently cut off by famine or disease. Yet we see Europeans settled under the parallel of 73° at Upernivik in Greenland, of 72° 2′ at Ustyarsk in Siberia, and of 70° 40′ at Hammerfest in Norway, and Europeans have wintered far north of this. But such facts only prove how much the human being with the resources of civilization can bear. The settlements in Greenland, Northern Siberia, Kamtchatka, and the Hudson Bay territories are all more or less connected by trade with southern countries, whence they derive their power of endurance; and from the constant care required in order to guard against the consequences of severe climate it is evident that to man the support of life within the polar circle must ever be difficult and precarious.

ARCTURUS, a fixed star of the first magnitude in the constellation of Arctophylax or Bootes.

ARDEA, an ancient city of Latium, 24 miles south of Rome, according to traditional history the capital of the Rutuli, whose king, Turnus, was a formidable rival to Æneas. It is now a small village in the midst of pestilential marshes.

ARDÈCHE, a department in the south of France (Languedoc), on the west side of the Rhone, taking its name from the river Ardèche, which rises within it, and falls into the Rhone after a course of 46 miles. It is bounded east by the departments of Isère and Drôme, south by Vaucluse and Gard, west by Lozère, and west and north by Haute-Loire and Loire; area, 2134 square miles. The department is generally of a mountainous character, especially in the north-west, where Mount Mezenc, the culminating point of the Cevennes, rises to the height of 5753 feet. There are large forests, the most valuable tree being the Spanish chestnut, which covers extensive tracts, and produces large quantities of excellent chestnuts. The rearing of silkworms is an important industry, and much wine is produced. Among the mineral productions iron and coal are the most important. The arrondissements are Privas, Largentière, and Tournon. Annonay is the principal town, but Privas is the capital. Pop. in 1901, 353,564.

ARDEE, a market town in Ireland, in the county of Louth, pleasantly situated on the small river Dee, in a fertile corn district, 36 miles N.N.W. of Dublin. It was formerly a walled town, and still has a castle, now used as the court-house, to which is attached the county jail. The spacious parish church, still in good condition, was formerly the church of an Augustine monastery. In the town there are likewise a Roman Catholic chapel and constabulary barracks. Malting is extensively carried on. Pop. in 1901, 1883.

ARDENNES, or ARDENNE, an extensive tract of hilly land stretching continuously over a large portion of the north-east of France and south-west of Belgium. None of the hills attain a great elevation, the highest, La Barraque Michel, being only 2230 feet. Anciently the whole tract formed one immense forest (*Arduenna Silva* of Cæsar); but though extensive districts are still under wood, large portions are covered with cultivated fields and populous towns. The country is better suited for pasture than tillage, however, and cattle, sheep, and a hardy breed of horses are raised in large numbers. Shakspere's forest of 'Arden' is undoubtedly not this forest but one with which he was familiar in Warwickshire.

ARDENNES, a frontier department in the north-east of France, bounded by Belgium on the north and north-east, by the department of Meuse on the south-east, of Marne on the south, and Aisne on the west, with an area of 2020 square miles. The principal rivers are the Aisne and Meuse, both navigable, and connected by the canal of Ardennes. The districts in the north part of the Forest of Ardennes are traversed by mountains covered with wood and heath, some of the plains in the south-west are naked and arid, while the central valleys are extensive and fertile. The pastures are excellent. There are extensive slate quarries, numerous iron-works, and important manufactures of cloth, iron-ware, leather, glass, earthenware, &c. There are five arrondissements, taking their names from the chief towns Mézières (the capital), Rethel, Rocroi, Sedan, and Vouziers. Pop. in 1901, 315,589.

ARDNAMURCHAN POINT, a cape in the county of Argyle, forming the most westerly point of the island of Great Britain. A lighthouse, the lantern of which is 180 feet above the level of the sea, and visible in clear weather 18 to 20 miles off, has been erected upon it.

ARDOCH, a village of Scotland, in Perthshire, about 8 miles S.S.W. of Crieff, having in its vicinity three Roman camps, one of which is the most perfect existing in Scotland.

ARDROSSAN, an active seaport of Scotland, in Ayrshire, situated on the Firth of Clyde. The town is of modern erection, and has become a favourite resort in the sea-bathing season, but it derives its chief importance from its shipping. There is here a good harbour, which it was intended originally to connect by canal with Glasgow and Paisley, but the canal never reached farther than Johnstone. Ardrossan now possesses ample means of communication by railway, and is rising rapidly in importance. The harbour is one of the safest, most capacious, and most accessible on the west coast. Coal and iron are extensively exported, and iron ore, timber, and general goods imported. Shipbuilding is carried on, and fishing also furnishes employment to the inhabitants. Pop. in 1861, 2896; in 1901, 6077.

ARE, the unit of the French land measure. It is a square, of which each side is 10 metres in length, and it has, therefore, a surface of 100 square metres, or 1076·44 English square feet. The tenth part of an are is called a *déciare*, and the hundredth a *centiare*. *Décare* is a surface of 10 ares. A *hectare* is 100 ares, equal to 2·47 English acres. The French generally express quantities of land in hectares, as we do in acres.

AREA (from the Latin, in which it signified, first, a threshing-floor; later, a vacant place bounded on all sides, or before a public building), in geometry, the superficial contents of any figure, and, generally, the quantity of surface any figure contains. In measuring any area we find how many times it contains some smaller area, which we can easily grasp in our mind, such as a square foot, a square yard, or a square mile, this smaller area serving as the unit of measurement for the time being.

ARECA, a genus of palms, possessing pinnate leaves, a double membranous sheath containing its bunches of flowers; fruit a one-seeded berry or drupe, with a fibrous rind. To this genus belongs the betel-nut or pinang palm (*Areca Catechu*), a native of the East Indies, and cultivated there in many varieties. It is a very beautiful palm, with a slender stem often 40 or 50 feet high. Its nuts, called betel-nuts, are rolled into a leaf of the betel-pepper along with a little lime, and are then chewed, a custom which is widely extended in the East, and has even been adopted by Europeans. The chewing of this mixture gives the breath a pleasant odour, and is said to preserve the teeth and gums, but it gives the former a disagreeable brownish-red colour. The nuts are looked upon as one of the necessaries of life, and form an important article of trade. They furnish also an extract called catechu, which is used in medicine. Another palm of this genus is the cabbage-palm (*Areca oleracea*), one of the most beautiful and

stately of the palm tribe, with a stem rising often to the height of 200 feet, terminated by a graceful plume of waving feathery foliage. It is a native of Jamaica and other West India Islands. The so-called cabbage is the terminal leaf-bud, which is very tender and delicious, either raw or boiled. Its removal, however, kills the tree. See plate at article PALMS.

ARENA. See AMPHITHEATRE.

ARENDAL, a seaport of Norway, at the mouth of the Nid in the Skager Rack, 36 miles north-east of Christiansand. It consists of wooden houses built on a rocky peninsula projecting into a commodious haven formed by two islands, and when approached from the sea presents, with its long ranges of white buildings lining the quays, and its handsome church crowning a height, a very imposing appearance. Its chief export is timber; its imports grain and other kinds of provision. Its trade is extensive. Pop. in 1900, 11,130.

AREOMETER, from the Greek words *araios*, thin, and *metron*, a measure, is a more correct term for the instrument commonly termed *hydrometer*.

AREOPAGUS, the oldest of the Athenian courts of justice, and at the same time the most famous for its respectability, purity, and love of justice. It obtained its name from its place of meeting, on the Hill of Ares (Mars), near the citadel. The Erinnyes, or Furies, and the deities of the lower world (Pluto, Hermes, and Gē) had also their altars on this hill. The establishment of this court is ascribed by some to Cecrops, by others to Solon; from the latter, however, it seems to have only received a better constitution and more important privileges, and it is probable that it existed from very remote times. Of how many members it consisted is not now known. A seat in it was held for life. The members were men who had formerly been archons, had rendered themselves worthy of this honour by the honest and diligent execution of their office, and whose character and conduct had been subjected to a particular examination. Aristides called the Areopagus the most sacred tribunal of Greece, and Demosthenes assures us that they never passed a sentence in which both parties did not concur. The crimes tried before this tribunal were wilful murder, poisoning, robbery, arson, dissoluteness of morals, and innovations in the state and in religion; at the same time they took care of helpless orphans. The other states of Greece also sometimes submitted their disputes to the judgment of the Areopagus. Its meetings were held in the open air and in the night time. After the investigation of a case the votes were collected. Till the government of Pericles this court of justice retained its purity inviolate; it was first encroached upon by his causing himself to be made a member without having been archon. It retained its respectability, however, for a long time, but sunk gradually with the decline of Athens.

AREQUIPA, a city of Peru and capital of a department of same name, 200 miles south of Cuzco. It is situated in a fertile valley, at the height of 7850 feet above the level of the sea, and has been rebuilt and extended since the earthquake of 13th August, 1868, which hardly left a single house habitable. Houses of one story are by far the most common. Behind the city rise three lofty mountains, one of which, the volcano of Arequipa, or Peak of Misti, is among the loftiest of the Andes, its height being 20,328 feet. Arequipa contains a cathedral, a university, a hospital, nunneries, convents, &c. It is subject to earthquakes, but this evil seems to be overbalanced by the mildness of the climate, and the beauty and fertility of the country. Arequipa is an important centre of trade between the coast and interior. Its port is Mollendo, which is connected by railway with Arequipa, and with Puno and other inland places. Pop. 35,000.

ARES. See MARS.

ARETHUSA, in Greek mythology, a daughter of Nereus and Doris, first a nymph of Artemis, then a famous fountain of the island Ortygia, which comprised a part of the city of Syracuse. She was changed by Artemis into a fountain in order to free her from the pursuit of the river-god Alpheus. See ALPHEUS.

ARETINO, GUIDO or GUI, a Benedictine monk of the eleventh century, born at Arezzo. He is said to have first reduced the science of music to a fixed system and to have been the inventor of the monosyllables of the *solfeggio—ut, re, mi, fa, sol, la*, drawn from the words of a Latin hymn. The monosyllable *si*, for the seventh of the scale, is a later invention. The syllables *ut, re, mi*, &c., are taken from a Latin hymn in honour of St. John, composed in 770:—

Ut queant laxis *Re* sonare fibris
Mi ra gestorum *Fa* muli tuorum,
Sol ve polluti *La* bii reatum.

ARETINO, LEONARDO. See BRUNO (LEONARDO).

ARETINO, PIETRO, one of the most famous Italian authors of the sixteenth century, was born at Arezzo in 1492, and was the natural son of a nobleman called Luigi Bacci. He received little education, but early displayed a talent for satirical poetry, and when still a young man was banished from Arezzo, on account of a sonnet against indulgences. He went to Perugia, where he worked for a short time as a bookbinder, and thence to Rome (1517), where he entered into the service of Leo X., and afterwards of Adrian VI. and Clement VII. His satirical powers were already known and feared throughout Italy, when, on account of the sixteen indecent sonnets which he composed as illustrations of as many designs of Giulio Romano, he was obliged to leave Rome (1524). Giovanni de' Medici invited him to his court and took him to Milan, where he found an opportunity to insinuate himself into the favour of Francis I. After having again visited Rome he returned to his protector, Giovanni de' Medici, who grew more and more attached to him, and died in his arms of his wounds. In 1527 Aretino went to Venice, where he acquired powerful friends, among whom was the Bishop of Vicenza, who reconciled the pope to him and recommended him to Charles V. so strongly that he was presented by him with a pension. By his devotional writings he regained the favour of the Roman court, and Julius III., who was also from Arezzo, was so pleased with a sonnet addressed to him by his countryman that he sent him 1000 crowns of gold and made him Knight of St. Peter. Three years afterwards he was personally introduced by the Duke of Urbino to the pope, who received him kindly, but would not gratify him by making him a cardinal. He died at Venice in 1557, in consequence of falling from his seat while indulging in a fit of immoderate laughter at an amusing adventure of one of his abandoned sisters. Aretino was a strange mixture of good-heartedness and malice, pride and fawning, courage and cowardice, ambition and grovelling coarseness. In his vanity he called himself 'the scourge of princes,' but he was their abject flatterer, and that solely for the purpose of obtaining money. The obscenity of some of his writings was such that his name has become proverbial for licentiousness. Yet his reputation was so high that it gained for him the name of *divine*, by which even Michael Angelo and Ariosto addressed him. His works consist of several religious compositions; five comedies and a tragedy, the former full of

wit and genuine comic humour, the latter not without merit; the licentious Ragionamenti and Puttana errante; sixteen profligate Sonetti lussuriosi; several pieces in rhyme, *stanze*, *capitoli*, partly laudatory and partly licentious and satirical; and some unfinished epics. The academicians of La Crusca counted Aretino among the classic authors of the nation. He deserved this honour less, however, for the purity than for the boldness, skill, and originality of his style.

ARETINO SPINELLO, or SPINELLI, an Italian painter, was born at Arezzo in 1323. He had as teacher Jacopo dei Casentini. Among his extant works, which are chiefly frescoes, there are still some specimens at Arezzo, though a number of others have perished. In 1385 he quitted Arezzo for Florence, where in one of the halls of the pharmacy of the convent of Santa Maria Novella he painted various subjects from the Passion. He decorated the sacristy of S. Miniato al Monte near Florence with subjects from the life of St. Benedict, which are among his most important works. There is a complete absence of linear or aërial perspective, but vigorous colouring and effective draperies. In 1400 he went to Pisa, where he painted six compartments of the Campo Santo, some of which are extant. Returning to Arezzo he painted in the church of St. Agnolo the Fall of the Rebel Angels. It was to have formed part of a series of the life of St. Michael, but it is said to have caused his death. He made the figure of Satan so hideous that he became terrified at it himself, and seeing the devil in a dream lost his reason and died some days afterwards in 1415. Spinelli has left some oil-paintings, though his works of this class were less numerous than his frescoes. Besides several at Florence there are at Berlin a Holy Family, The Presentation at the Temple, The Last Supper, and The Annunciation; at the Louvre, The Virgin in a Glory, The Coronation of the Virgin, and several others.

AREZZO (the ancient *Arretium*), a city of Italy, capital of a province of the same name in Tuscany, situated on the slope of a hill near the confluence of the Chiana with the Arno. It is surrounded by walls, has paved, regular, and for the most part well-built streets, a large square, a noble cathedral, containing some fine pictures and monuments; numerous churches, an academy of science, a library, a museum, remains of an ancient amphitheatre, &c. It has some manufactures. Arezzo is one of the oldest cities of Tuscany, having formed a powerful member of the league of the twelve chief Etruscan towns. In the contests of the Guelfs and Ghibellines it took the side of the latter and was continually hostile to the Florentines, by whom its inhabitants were defeated in the battle of Camaldino, in which Dante took part. It afterwards became subject to Florence. Arezzo is the birth-place of Mæcenas, Petrarch, Pietro Aretino, Redi, Pope Julius III., and Vasari. Pop. in 1901, 15,800.—The province of Arezzo contains 1276 square miles and 272,359 inhabitants.

ARGAL, ARGOL, or TARTAR, a hard crust formed on the sides of vessels in which wine has been kept, red or white, according to the colour of the wine. On being purified it is termed cream or crystals of tartar. It consists of tartaric acid combined with potash. White argal is preferable to red, as containing less organic colouring matter. The marks of good argal of either kind are its being thick, brittle, hard, brilliant, and little earthy. That brought from Germany is the best, on account of its being taken out of those great tuns wherein the salt has time to crystallize. Argal is of considerable use among dyers, as serving to dispose the stuffs to take their colours the better. See TARTARIC ACID.

ARGALI (*Caprovis Argali*), the mountain or wild sheep. This animal is regarded as the savage stock whence the endless varieties of domestic sheep are descended, though it is difficult, from an inspection of the argali, to conceive how so wild and energetic an animal could, by any management, be converted into the creatures of which our flocks are composed. In size the argali equals the common ox, and in aspect and bearing resembles the wild goat, though the huge, laterally-twisted horns give the head a very marked similarity to that of the common ram. These horns are very large, arise near the eyes, curve first backwards and then forwards, and have the points directed forwards and outwards; from their base they are transversely waved or wrinkled for half their length, the remainder being nearly smooth. Their average length is 4 feet measured along their outer curve, the circumference being about 19 inches. The horns of the female are more like those of the common goat, rising directly upwards, and curving gently backwards, especially towards the extremity. In summer the argali is covered with harsh and rather short hair, generally of a grayish-yellow colour, and possesses a blackish or reddish stripe along the back, and a large spot of the same colour on the rump. The inferior parts of the body and inside of the thighs are of a pale reddish-white; in winter the colour is a deeper red, with a greater whiteness about the muzzle, throat, and belly. The mountain sheep is found in considerable numbers on the elevated ranges of Northern Asia, in the deserts or *steppes* of Siberia, whilst in the New World the place of the argali appears to be occupied by the 'Bighorn,' or Rocky Mountain Sheep of California—an animal formerly confused with the argali. The argalis live in herds or families, consisting of a male with the females and young, and seek their food on the lofty elevations, covered only with lichens or small shrubs. They are shy and timid, and when disturbed retreat with a swiftness and agility which renders pursuit hopeless, as they bound from rock to rock with security, and are soon lost to sight. It is by stealing upon them against the wind, or lying in ambush near where they must pass, that the hunter is enabled to make them his prey. In the spring of the year, when under the influence of sexual excitement, the males acquire a warlike disposition, and severe and obstinate combats take place for the possession of the females.

ARGAND-LAMP. See LAMP.

ARGAUM, a village of India, in the province of Berar, 35 miles W.S.W. of Elichpur, celebrated for the victory of General Wellesley (Duke of Wellington) over the Mahrattas under Scindia and the Rajah of Berar. After the battles of Assaye and Laswaree, Wellesley had made peace with Scindia, it being a condition that the latter should separate his troops from those of the Rajah of Berar. As he failed to comply with this condition Wellesley regarded the treaty as violated and prepared to attack the allies. He came upon them at Argaum on 29th November, 1803, and after a battle, in which the chief resistance was made by two regiments of Persians, completely routed them. Soon after the battle Wellesley reduced the fortress of Gawilgurh, belonging to the rajah, whereupon the allies gave in their submission.

ARGEMONE, in botany, a genus of plants of the natural order Papaveraceæ, with six (or accidentally four to five) petals, numerous stamens, style short; stigma divided into three to seven lobes. They are herbaceous annuals with glabrous leaves and yellow or white flowers. The genus belongs to America and equatorial Asia. The *A. Mexicana*, a native of Mexico and the South of the United States, has an acrid and drastic juice, which is used as an external

application in diseases of the skin. The seeds are narcotic and purgative. It is grown as an ornamental plant in European gardens.

ARGENT (French for silver, from the Latin *argentum*), a word used in heraldry for silver, and in several terms of art employed by the goldsmiths.

ARGENTAN, a town in the French department of Orne (Normandy), picturesquely situated on the Orne, 30 miles north-west of Alençon. It has two interesting churches and an old castle, and manufactures of leather, gloves, and lace. Pop. (1891), 5728; (1901), 5668.

ARGENTEUIL, a town in France, department of Seine-et-Oise, on the right bank of the Seine, 7 miles below Paris. It lies in a fine district abounding with vineyards and gardens, from which much wine, fruit, and vegetables are sent to the Parisian market. Pop. (1891), 11,799; (1901), 15,708.

ARGENTIERA (the ancient *Cimolus*), an island in the Grecian Archipelago, about 18 miles in circumference, rocky and sterile. Formerly silver mines were worked here. The whole island is covered with a sort of chalk, called *Cimolian earth* (which see).

ARGENTINE REPUBLIC (*República Argentina*), formerly called the United Provinces of La Plata, a country of South America, the extreme length of which is 2300 miles, and the average breadth a little over 500 miles, the total area being about 1,200,000 square miles. It is bounded on the north by Bolivia; on the east by Paraguay, Brazil, Uruguay, and the Atlantic; on the south by the Antarctic Ocean; and on the west by the Andes. It comprises fourteen provinces and nine territories. In the north there are the provinces of Tucuman, Salta, and Jujuy, and the territories Misiones, Formosa, and Chaco. In the western region are Catamarca, Rioja, San Juan, and Mendoza. The central region contains the provinces of Santiago del Estero, Cordova, and San Luis; and on the eastern frontiers there are the provinces of Corrientes, Entre Rios, Santa Fé, and Buenos Ayres. The southern territories comprise Pampa, Rio Negro, Neuquen, Chubut, Santa Cruz, and the eastern part of Tierra del Fuego. Thus the republic now includes the formerly separate region known as Patagonia. The capital of the state is Buenos Ayres (or Aires); the other chief towns are La Plata, Rosario, Cordova, Tucuman, Mendoza, Santa Fé, Paraná, Corrientes, and Salta.

With the exception of the north-west, where there are several ranges or sierras running north and south, and the province of Entre Rios, the characteristic feature of the country is the great level plains called 'pampas'. Of the sierras referred to we have in the extreme north the Sierra Lumbre, continued southwards by the Sierras de Aconquija and Ancaste, to the west of which latter, in Rioja, are the Sierras Velasco and Famatina. South-east of the Ancaste range, and separated from it by the Salinas Grandes, is the Sierra de Cordova, in the province of that name. There are also lower hills in some other parts. In Patagonia south of the Rio Negro the country is higher than farther north, and is generally rather arid and sterile. In the northern territories of Chaco and Formosa the plains are partly forest-covered, but all the central and southern parts present vast treeless tracts, which afford pasture to immense herds of horses, oxen, and sheep, and are varied in some places by brackish swamps, in others by salt steppes. These *salinas*, as the surfaces incrusted with salt are called, occur towards the west, the chief of them being the Salinas Grandes above mentioned. During short periods they are converted by rain into salt lakes.

The great watercourse of the country is the Paraná, having a length of fully 2000 miles from its source in Brazil to its junction with the Uruguay, where begins the estuary of La Plata. The Paraná is formed by the union of the Upper Paraná and Paraguay rivers, near the N.E. corner of the state. Of these the former constitutes the entire boundary between Paraguay and the republic on the south of the former country, but from its junction with the Paraguay, a little above Corrientes, to its mouth it is entirely in Argentina. The Paraguay flows south through the country of the same name for a considerable distance, but from about Asuncion to its junction with the Paraná it constitutes part of the eastern boundary of the republic. Important tributaries are the Pilcomayo, the Vermejo, and the Salado. The Uruguay after separating in its upper course Misiones and Corrientes on the west from Brazil on the east, in its lower course divides Argentina from the Uruguay Republic, widening below Concepcion as it approaches the La Plata estuary. The Paraná, Paraguay, and Uruguay are valuable for internal navigation, being navigable throughout their whole course in the republic; but the tributaries mentioned are shallow and difficult. Many of the streams which flow eastward terminate in marshes and salt lakes, some of which are rather extensive. Not connected with the La Plata system, and in the south of the state, are the Colorado and the Rio Negro, the latter formerly the southern boundary of the state, separating it from Patagonia. The source of the Negro is Lake Nahuel Huapi, in Patagonia (area, 1200 square miles), in the midst of magnificent scenery. The level portions of the country are mostly of tertiary formation, and the river and coast regions consist mainly of alluvial soil of great fertility. In the pampas clay have been found the fossil remains of extinct mammalia, some of them of colossal size.

European grains and fruits, including the vine, have been successfully introduced, and are cultivated to some extent in most parts of the republic, but the great wealth of the state lies in its herds of cattle and horses and flocks of sheep, which are pastured on the pampas. The vine is cultivated chiefly in the western states, and Tucuman is the chief sugar-producing province. Wheat is now grown on about fifteen million acres, maize on about half that area; other valuable crops are flax and oats. The chief stock-raising provinces are Buenos Ayres, Entre Rios, Santa Fé, and Cordova, and in a less degree Corrientes, Santiago, and the Pampas territory. At present the country possesses more than 29,000,000 head of cattle, fully 67,000,000 sheep, about 7,500,000 horses, and about 5,000,000 goats and other animals. Gold, silver, nickel, copper, tin, lead, and iron, besides marble, jasper, precious stones, and bitumen, are found in the mountainous districts of the N.W., while petroleum wells have been discovered on the Rio Vermejo, and in Mendoza; but the development of this mineral wealth has hitherto been greatly retarded by the want of proper means of transport. Coal and salt are also found abundantly. Forests exist chiefly in the Gran Chaco region. Thousands of square miles are covered with thistles, which grow to a gigantic height in their season, and cacti form great thickets. Peach, orange, apple, and other fruit-trees are abundant in many districts. The native fauna includes the puma, the jaguar, the tapir, the llama, the alpaca, the vicuña, armadillos, the rhea or nandu, the guanaco, the chinchilla, the nutria, the biscacha, &c. The climate is generally agreeable and healthy, 97° being about the highest temperature experienced, and the mean annual temperature varies from about 56° to about 70°. The northern part is hotter than the rest of the country, and in some other parts the climate is of a

rather disagreeable character. The rainfall is nowhere excessive and in some parts is scanty.

As a whole this vast country is very thinly inhabited, some parts of it being as yet very little known. Much the most populous province is Buenos Ayres, which (including the city) contained in 1908 2,836,000 persons, or fully 24 to the square mile. The capital, Buenos Ayres (or Aires), itself in 1910 had a population of 1,272,124, being thus the largest city in South America. The lowest province (excluding territories) in point of absolute population was Jujuy in the extreme north, with 59,075, or 3·1 to the square mile, being thus also the least densely populated of the provinces. The smallest but most densely peopled was Tucuman, with 32·8 to the square mile. The total population of the whole country in 1908 was 6,489,023, or about 5·7 to the square mile. In 1903 the population (including Indians) was estimated at 5,191,000. The native Indians were never very numerous, and have given little trouble to the European settlers. Tribes of them still in the savage state inhabit the less-known districts, and live by hunting and fishing. More than half the population are Europeans or of pure European descent. Large numbers of immigrants arrive from Southern Europe, the Italians having the greatest proportion, after these coming in order the Spaniards, French, and Germans. There are foreign agricultural colonies in various parts of the state, including Jewish colonies in the provinces of Entre Rios, Buenos Ayres, and Santa Fé. Near the mouth of the Chubut River in Eastern Patagonia is an English colony, including some 1200 Welsh settlers. The bulk of the population is Spanish or of Spanish descent, and Spanish is the official language. The *Gauchos* of the plains or pampas are a hardy, half-breed race of partial Indian descent, highly skilled as horsemen and in the use of the lasso.

The executive power is vested in a President, elected for six years by representatives of the provinces, numbering 300 in all. The legislative body consists of two houses, forming the National Congress. The upper house, or Senate, consists of 30 members, two from each province and two from the capital; in the capital these are elected by a special body of electors, in the provinces by the legislatures. The House of Deputies comprises 120 members elected by the people. Deputies must be at least 25 years of age, and must have been citizens for at least 4 years; they are elected for 4 years, one-half of the chamber retiring every 2 years. The minimum age for senators is 30, and the period of citizenship 6 years; one-third of the senate retires every 3 years. Members of both houses are paid 12,000 pesos annually, but senators must have an independent income of at least 2000 pesos. The chairman of the Senate is the Vice-President, elected in the same way as the President. Both these officers must be Roman Catholics, and Argentines by birth, and they cannot be re-elected. The ministry consists of eight secretaries of state, namely, for the interior, foreign affairs, finance, war, justice, marine, public works, and agriculture. The provinces have complete local autonomy, the local constitutions being mostly reduced copies of the central government above described. The state religion is the Roman Catholic, but all creeds are tolerated. Primary education is by law compulsory between the ages of 6 and 14, and is free and secular, but school attendance is far from satisfactory. There are universities at Cordova, Buenos Ayres, and La Plata, and there are also agricultural and other special schools. Military service is compulsory between the ages of twenty and forty-five, those men serving their first ten years forming the 'active' army. The navy consists of about twenty vessels from battleships and first-class cruisers to gunboats, &c.

The principal articles of export are wool, grain (wheat and maize chiefly), hides and skins, flax-seed, beef and mutton, tallow, cattle, butter, &c. The imports comprise textiles and apparel, various food substances, iron and iron manufactures, railway materials, wood and wood manufactures, paper, coal, coke, oil, pottery, glass, chemicals, &c. The total value of the exports for 1909 was £79,470,000, of which animals and their produce formed the larger share, but cereals, flax-seed, &c., are increasing rapidly. The chief countries to which the exports are sent are the United Kingdom, France, Germany, and Belgium. The imports for 1909 were valued at over £60,550,000, the chief countries from which they came being the United Kingdom, Germany, the United States, France, and Italy, of which the first contributed nearly two-fifths. The chief ports are Buenos Ayres, Rosario, La Plata (Ensenada), and Bahia Blanca. The silver *peso* or dollar, of 100 *centesimos*, is the chief coin, being of a par value of 4s., but a depreciated paper currency is most in use. The nominal standard is gold. The metric system was made compulsory in 1887. The national debt amounts to about £95,000,000. Since 1860 railways have been constructed so as to connect the capital with most of the chief towns. The total mileage open is now over 16,000, of which part is national property, part provincial, and part private. There is now a trans-Andine line connecting Buenos Ayres with Valparaiso. Tramway lines and telegraphs have been extensively developed.

The river La Plata was discovered by Spaniards early in the sixteenth century. In 1535 Don Pedro de Mendoza, on his way to Paraguay, built a fort on the present site of Buenos Ayres, but it was soon destroyed by Indians; and it was not till 1580 that Don Juan de Garay took formal possession of the country and founded the city. At that time and for nearly two centuries afterwards the whole country from the mouth of the Plata to the Pacific, including Paraguay, formed part of the viceroyalty of Peru; but in 1776 La Plata, comprising all the Spanish dependencies east of the Andes, was severed from Peru and erected into an independent government. In 1806 Buenos Ayres was taken by a British force under General Beresford, but shortly afterwards it was recaptured, and a second attempt on it by General Whitelock two years later was repulsed. In 1810, owing to the conquest of Spain by the French, the Spanish authority was thrown off, and in that year a provisional independent government was declared. For many years afterwards affairs were very unsettled, and revolutions were extremely frequent, or rather order and peace were occasionally maintained for a short time. Various defections, especially that of Paraguay, narrowed the limits of the state, whose independence was not formally recognized by Spain till 1842. On May 15th, 1853, the present constitution was agreed to, save that in 1860, when Buenos Ayres joined the confederacy, some changes were made. From 1865 till 1870 the Argentine Republic, in alliance with Brazil, was at war with Paraguay (which see), the result being disastrous for that country. In 1890 there was a serious financial crisis, and in 1895 a bill was carried authorizing the central government to assume responsibility for the provincial debts. A boundary dispute with Chili, which seemed not unlikely to result in war, was in 1898 referred to British arbitration and was settled in 1902.

ARGILLACEOUS ROCKS are rocks in which clay prevails. They include clay, clay-slate, shale, &c. See GEOLOGY, CLAY, SLATE, &c.

ARGO. See ARGONAUTS.

ARGOL. See ARGAL.

ARGOLIS. See ARGOS.

ARGON (Greek, *argos*, inactive—from its inert character), a gaseous constituent of the atmosphere recently discovered, and existing to the extent of one per cent in the nitrogen. It is heavier than oxygen, and nearly as dense as carbonic acid. It is unaffected by most chemical reagents.

ARGONAUT, or PAPER NAUTILUS. See PAPER NAUTILUS.

ARGONAUTS, in the legendary history of Greece, a number of heroes who, in a ship called the Argo, performed a hazardous voyage to Colchis in quest of the golden fleece, under the leadership of Jason. Jason's uncle Pelias had usurped the kingdom of Iolcos and would only resign it on condition that Jason should first bring from Colchis the golden fleece of the ram on which Phryxus and Helle (see ATHAMAS) had escaped the persecutions of their stepmother Ino; for Phryxus, having sacrificed the ram, had hung up the fleece in a consecrated grove at Colchis. Jason engaged to accomplish the adventure, and the most valiant heroes of Greece took part with him. Among them were Hercules, Castor and Pollux, Peleus, Admetus, Meleager, Orpheus, Telamon, Theseus and his friend Pirithous, Hylas, Lynceus, and many others. Having sailed with favourable winds from the promontory of Magnesia, in Thessaly, they safely reached the harbour of Lemnos, where they remained two years. The women of Lemnos, instigated by the offended Aphrodite (Venus), had slain all the males among them, except Thoas, and detained among them the welcome strangers. At length they sailed to Samothrace, and from that island proceeded to the Troad. Here Hylas rambled and lost his way, and Hercules, who went in search of him, remaining too long on shore, the vessel sailed without them. Thence they went to the city of King Cyzicus, where the king received them hospitably. But at night, being forced back by a storm, they were taken for enemies; a contest followed, in which Jason slew the king by mistake. They then sailed to the east, and landed in the country of the Bebryces. Driven by a storm to the shores of Thrace, the Argonauts sailed thence to Salmydessus, where the blind soothsayer Phineus was king. Phineus gave the strangers directions. After various adventures they approached the dreaded Symplegades, rocks which closed together and dashed in pieces vessels passing through them. According to instructions previously received, they caused a dove to fly through before them, and followed, rowing with all their strength, while Orpheus played on his lyre. The rocks stood firm, and the danger was escaped. The last adventure awaited them at the Island of Aretias (or Dia). Here they found the Stymphalides, birds which shot their feathers like arrows, and from which the heroes could only protect themselves by a violent clashing of weapons. At last the shore of Colchis—the eastern shore of the Black Sea—appeared in view; they landed at night at the mouth of the Phasis. King Æetes, previously informed of the design of the strangers, and fearing their power, did not refuse absolutely to deliver the golden fleece, on which his life depended, but charged Jason with three dangerous labours, thus hoping to destroy him. Jason was to yoke the two fire-breathing bulls of Hephæstus to a ploughshare of adamant, and to plough with them four acres of land consecrated to Ares (Mars), and never before turned up. He was then to sow in the furrows the remaining serpents' teeth of Cadmus, in the possession of Æetes, and to kill the armed heroes which they produced; at last, to fight with and slay the dragon that guarded the golden fleece. All three labours he was to accomplish in a single day. To rescue the hero, Hera and Athena, who had instructed Medea, the daughter of Æetes, in magic, infused into her an ardent love for Jason, and in return for a promise to conduct her home as his bride she gave him a mixture to anoint himself with, a stone to throw among the formidable heroes sprung from the serpents' teeth, and herbs and a drink to lull to sleep the dragon. Thus equipped, in the sight of the king and assembled people Jason yoked the formidable bulls, and ploughed with them the fatal field, sowed the serpents' teeth, and threw among the armed host that arose the stone given him by Medea, upon which they turned their weapons against one another, and in a furious conflict all perished. Æetes, terrified, commanded him to delay the last adventure. Contriving another plan, he resolved to murder Jason and his companions, and to burn the sacred *Argo*. Being informed by Medea of the king's design, Jason hastened by night to the consecrated grove, lulled to sleep the dragon by the magic potion, took the golden fleece from the oak on which it hung, and fled with Medea and his companions. The fugitives were pursued and on the point of being overtaken when Medea averted the danger by killing her brother Absyrtus, and strewing on the road his mangled limbs. The unhappy father quitted the pursuit to collect the bloody limbs of his son and the fugitives escaped. The course of the Argonauts is now rather difficult to follow, as we find them next reaching the Adriatic Sea by the Ister (Danube). Being told by an oracle that issued from the mast of the *Argo* that they would not reach their country till Jason and Medea had atoned for the murder of Absyrtus, they directed their course to the port of Æea, to Circe, sister of Æetes. She, however, refused them expiation, but directed them to the promontory of Malea, where they might obtain it. On their voyage they encountered the frightful Scylla and Charybdis, the alluring Sirens, and a fearful storm. Then they came to Crete, where the brazen giant Talos, who guarded the island, opposed their landing. A single vein ran from his head to his heel, and was closed below by a brass nail. Medea gave him an intoxicating potion, and opened the vein that he might bleed to death. At last they reached the promontory of Malea; their crime was expiated, and without further misfortune the *Argo* arrived at Iolcos. The further fortunes of Medea and Jason are related in the articles under their names. The tales describing the return of the Argonauts differ very essentially. We still possess a poem on this subject by Apollonius of Rhodes (in Greek), and one by Valerius Flaccus (in Latin).

ARGONNE, a district of France, between the rivers Meuse, Marne, and Aisne, now contained in the departments of Marne and Ardennes. The wood of Argonne is celebrated for the campaign of Dumouriez against the Prussians in 1792. St. Menehold was the capital.

ARGOS, an ancient city and district of Greece, in the Peloponnesus. Homer sometimes calls the whole Peloponnesus Argos, and applies the name Argeioi (Latin Argivi) to all the Greeks. The territory or district of Argos was known as Argolis, and under the Romans was bounded north by Achaia and Corinth, north-east by the Saronic Gulf, west by Arcadia, south by Laconia, and south-west by the Argolic Gulf. This district contains one of the largest plains of the Peloponnesus, yielding corn on the driest parts, cotton and vines where moisture is greater, and rice in the most marshy parts. Argos was first inhabited by the Pelasgians, and subsequently by the Achæans. At an early period

Mycenæ was the chief city, and Agamemnon is represented as ruling there, with the title of 'king of men', and with a sort of sovereignty over the Peloponnesus. Subsequently Argos became again the chief city, and extended its sway over Lacedæmon. Both Mycenæ, and another famous city Tiryns, are represented by notable ruins, which have been investigated by Schliemann. The conquest of Argos by the Dorians forms the first really authenticated event in its history. Argos was now a Doric city, though it retained with part of its Achæan population some of its ancient habits, particularly the worship of Hera (Juno). It had also a temple of peculiar sacredness to Apollo. It was long the first Dorian city in Greece, Sparta being the second, and Messene the third. In the eighth century B.C. Phædon, king of Argos (B.C. 770–730), seized on the presidency of the Olympic games and attempted to make himself master of the Peloponnesus. He was defeated by the Spartans and the Eleans. From this time Argos gradually declined and Sparta rose. The last blow to the political ascendency of Argos was given by Cleomenes of Sparta, who defeated the Argives with a loss of 6000 citizens about B.C. 510. From the time of the ascendency of Sparta, Argos was divided between a democratic and an oligarchic party, the former of which inclined to the Athenian, the latter to the Spartan alliance; but the general spirit of the city tended towards enmity to Sparta. In the Persian war the Argives took no part. During the first ten years of the Peloponnesian war they remained neutral, but in 421 Argos joined a league against Sparta with Mantineia, Corinth, and Elea, and in the following year formed a treaty with Athens. The allies were defeated at Mantineia in 418. One regiment of the Argives, composed of the aristocratic citizens, defeated its opponents, while the democrats were overthrown. By means of this regiment the government was overturned and a league made with Sparta. Soon, however, the citizens rose, and, expelling the Spartans, renewed their league with Athens, which continued till the end of the war. In 362 Argos fought with Thebes against Sparta and Athens. The celebrated Pyrrhus was killed in an invasion of Argos in 272. In 229 Argos joined the Achaian League, to which it continued to adhere till its overthrow by the Romans. The harbour of Argos was Nauplia. Argos, including the island of Cerigo, forms a nomarchy of the kingdom of Greece, with a population (1907) of 81,943. The capital and port is Nauplia. The town of Argos is a straggling modern place, with houses mostly surrounded by gardens, and few buildings of importance. The chief relic of the ancient city is the theatre. There is an acropolis, 1000 feet high, crowned by a ruined castle. Pop. (1896), 9980.

ARGOSTOLI, a city of the Ionian Islands, capital of Cephalonia, on a small peninsula on the east shore of the gulf to which it gives name. The harbour is considered the best in the Ionian Islands, and there are excellent quays. The town is the residence of a Greek bishop. Pop. (1896), 9240.

ARGUIM, or ARGUIN, an island on the west coast of Africa, not far from Cape Blanco, between 30 and 40 miles long, and 1 broad. A fort was erected in it by the Portuguese in 1461; it was taken by the Dutch in 1638, by the English in 1665, ceded to the French by the Treaty of Nimeguen in 1678, and abandoned in 1763.

ARGUMENT, a term sometimes used as synonymous with the *subject* of a discourse, but more frequently appropriated to any kind of method employed for the purpose of confuting or at least silencing an opponent. Logicians have reduced arguments to a number of distinct heads, of which the only one which can be said to have truth only for its object is the *argumentum ad judicium*, which is founded on proof and addressed to the judgment. Other methods more frequently employed, where victory rather than truth is the object, include the *argumentum ad verecundiam*, which appeals to the modesty of an opponent by reminding him of the great names or authorities by whom the view disputed by him is supported; the *argumentum ab ignorantia*, which insists that the opponent shall either adopt the view contended for or suggest a better; and the *argumentum ad hominem*, which takes advantage of the particular circumstances or concessions of an opponent, and shows that whatever be the real merits of a particular view, he at all events is bound to adopt it if he means to be consistent.

ARGUS, in Greek mythology, a peculiar being represented as having a hundred eyes, or as having his whole body covered with eyes, half of these being always awake while the rest were closed in sleep. The jealous Hera made him keeper of the unhappy Io (see Io); but Hermes lulled him to sleep with the sound of his flute, and cut off his head; hence Hermes is called *Argiphontes*, or 'Slayer of Argus'. Hera afterwards took his eyes to adorn the tail of the peacock.

ARGUS PHEASANT. See PHEASANT.

ARGYLE, or ARGYLL, an extensive county in the south-west of the Highlands of Scotland, consisting partly of mainland and partly of islands belonging to the Hebrides group; on the land side bounded north by Inverness; east by Perth and Dumbarton; elsewhere surrounded by the Firth of Clyde and its connections, the North Channel, and the Atlantic Ocean; area, 3213 square miles, or 2,056,400 acres. The greatest length of mainland is about 115 miles; the breadth is very irregular, being upwards of 60 miles, from Ardnamurchan Point to the north-east extremity of the county in the north, and not much over 10 miles at its southern extremity. From the windings of the numerous bays and creeks with which the land is everywhere indented it is supposed to have more than 600 miles of sea-coast. Its principal inlets are Loch Sunart, Loch Linnhe, Loch Etive, and Loch Fyne. Argyle is popularly divided into five districts—Cowal, Lorn or Argyle proper, Cantyre, Morven, and Sunart, having various subdivisions, such as Appin, Glenorchy, Ardnamurchan, and Knapdale. The county includes the islands of Tiree, Coll, Mull, Islay, Jura, Staffa, Iona, Lismore, Kerrera, Seil, Easdale, Luing, two Shunas, Lunga, Scarba, Colonsay and Oronsay, Gigha, Sanda, Gometra, Garvelloch, Ulva, &c. The chief towns are the county town Inveraray, Campbeltown, Oban, Dunoon, Lochgilphead, and Tobermory. For a long time this county scarcely formed part of the kingdom, being subject to the Macdonalds of the Isles, who assumed regal and independent sway over it. The estates, titles, and jurisdiction of the latter, however, subsequently fell to the Campbells. The Duke of Argyle and the Earl of Breadalbane (both Campbells) are the chief landed proprietors.

The general features of the county are varied and striking, consisting of lofty mountains, deep glens, and inlets of the sea running far into the land. Towards the north it exhibits the wild grandeur characteristic of the West Highlands of Scotland. The western termination of the great Grampian range is within the county. The mountain masses which stretch north-east from the River Awe into Perth and Inverness consist chiefly of granite, which also extends along the north-west shore of Loch Linnhe into Sunart and Morven. In almost every other part of the mainland (especially among the

Grampians, on the eastern borders of the county), and in several of the islands, as Islay, Jura, &c., mica-slate is the prevailing rock, and is extensively quarried. Limestone, sometimes in the form of tolerable marble, is found; and a small coal-field has been worked near Campbeltown. The climate, though variable, is on the whole mild. The hills and forests abound with red-deer, roe-deer, and other game. The coast, although rocky, being indented with numerous deep bays and lochs, affords abundance of safe and excellent harbourage. In the interior there are several lakes, the principal of which are Loch Awe, Loch Shiel, Loch Eck, Loch Avich, and Loch Lydoch, partly in Perthshire. The county is intersected by numerous streams, but none are of importance. Both lakes and streams abound with fish. The soil is of a mixed character, the pasture various, many of the hills being covered with heath, while others are green on their summits. Numerous cattle and sheep are reared, the latter numbering over 1,000,000. A comparatively small area is under tillage (only about 133,000 acres), though some of the glens are fertile and in good cultivation, particularly Glendaruel, the finest in the county. Agricultural produce is chiefly confined to barley, oats, and potatoes. The chief articles of export are sheep, cattle, horses, fish, slate, and granite. One of the most important branches of industry is the fishing of herring, cod, and ling, which abound on the coast and around the islands. The principal manufactures are whisky and coarse woollens, the former being pretty extensive. The roads are generally good, and a railway, opened in 1880, connects Oban with Callander. A great impulse has been given to the prosperity of Argyleshire by the extension of steam navigation. By this means the most distant parts of the county are brought into easy communication with one another and with Glasgow, to which the inhabitants can now send their stock and produce with the certainty of finding a ready market. The Crinan Canal, constructed across the isthmus that joins Cantyre and Knapdale to the mainland, greatly shortens the passage from the Firth of Clyde to the West Highlands. Among the antiquities of Argyleshire are the celebrated monastery of Iona, the remains of a Cistercian priory in Oronsay, and the castles of Dunstaffnage on Loch Etive, Ardtornish on the Sound of Mull, Skipness in Cantyre, and Kilchurn on Loch Awe. The most noted of its natural curiosities are the basaltic columns and cave of Staffa. The population of the county in 1861 was 79,724; in 1891, 74,085; in 1901, 73,665.

ARGYLE, Marquis and Dukes of. See Campbell; also Argyll in Supp.

ARGYRO-CASTRO, Turkish Ergeri, a town of Albania (European Turkey), about 40 miles north-west of Janina. It is picturesquely situated on an elevated rocky site, intersected by deep ravines, across which several stone bridges have been cast, and is overlooked by a dilapidated castle. In 1812 Ali Pasha made himself master of the town and fortified it. It then had a population of about 13,000, but this has since fallen to about 8000.

ARIA, in music. See Air.

ARIADNE, in Greek mythology, a daughter of Minos, king of Crete, who, having fallen in love with Theseus when he was engaged in his attempt to destroy the Minotaur, gave him a clue of thread, which served to guide him out of the labyrinth after having slain the monster. Theseus, on leaving the island, took with him Ariadne, but abandoned her on the Isle of Naxos, where she was found by Bacchus, who married her. This incident is often referred to in ancient and modern literature.

ARIANA, the ancient name of a large district in Central Asia, comprehending nearly the whole of ancient Persia, and bounded on the north by the provinces of Bactriana, Margiana, and Hyrcania, east by the Indus, south by the Indian Ocean and the Persian Gulf, west by Media and the mountains south of the Caspian.

ARIANO, a town in South Italy, in the province of Avellino, 44 miles north-east of Naples, on a steep hill in one of the most frequented passes of the Apennines, on the main road from Naples to Puglia. It is the seat of a bishop, and contains a handsome cathedral. Pop. (1901), 17,650.

ARIANS, the adherents of the Alexandrian bishop Arius, who, about A.D. 318, put forward the doctrine that Christ is the most noble of all created beings, but is inferior to God, and produced by his free-will. This opinion was condemned in the Council of Alexandria (320) and in that of Nice (325) by the orthodox church, which declared that the Son has perfect equality of essence with the Father, and expressed his relation by the phrase *eternal generation*. The articles specially relating to the Trinity in the Nicene and Athanasian Creeds arose from the contest against Arius, who had reiterated and emphasized his doctrines, all of them tending to depreciate the position of the Son in comparison with the Father. Though his party was banished he procured powerful adherents; and Constantine the Great was attempting to bring about the restoration of Arius to the Catholic communion, when the latter died suddenly, 336. After his death his party gained considerable accessions, and Constantine, a short time before his decease (337), caused himself to be baptized in the Arian mode. Under Constantius Arianism became the religion of the court; it had its own liturgy, and after 350, when Constantius ruled alone, it prevailed also in the West, and Rome was obliged to receive the Arian bishop Felix. The divisions among the Arians themselves, in the meantime, prepared a final victory for the Catholic Church, which held the former constantly under its anathema. At first the Semi-Arians, or Half-Arians, whose leaders, Basil of Ancyra and George of Laodicea, were powerful in Syria, approximated to the Catholic creed by maintaining a similarity of essence between the Son and the Father (*homoiousia*, hence the name *Homoiousians*), and thus gained the superiority at the imperial court. But the victory of the orthodox was promoted by the excesses of the strict Arians, Ætius, and Eunomius of Cappadocia, together with their numerous adherents, who, in the council of Sirmium (357), by maintaining that the Son of God is a wholly different being from the Father (hence *Heterousians*, *Anomœans*), excited even the Semi-Arians against them, and by insisting on practising baptism by immersion aroused even the opposition of the people. The Emperor Julian the Apostate, who, from contempt towards Christianity, tolerated all sects, ended the contest, and suffered no religious disputes to rise. Arianism again ascended the throne in the East with Valens (364), and, growing bold, proceeded to acts of violence against the Catholics; but Gratian maintained peace. Theodosius restored the dominion of the ancient faith, and the divisions among the Arians themselves hastened the downfall of their influence. After the first half of the fifth century Arianism was extinct in that portion of the Roman Empire which still remained under imperial rule. Among the Goths, who had been converted to Christianity by Arian teachers (about 340), it prevailed in the West till the victories of the orthodox Frank, Clovis, and the reformation of the church by the Visigothic king Reccared, suppressed it here also at the end of the fifth century.

About this time it was destroyed among the Suevi in Spain, among whom it had prevailed for a century. The Burgundians, who received it in 450, had already renounced it at the beginning of the sixth century. It was more difficult to convert the Vandals to the Catholic faith. Ever since 430 they had been strict Arians, and propagated the doctrines of their sect in Northern Africa, even by the severest persecutions. The victories of Belisarius (534) first put an end to their kingdom, as well as to their separation from the orthodox church. Arianism was maintained longest among the Lombards, who brought it to Italy, and adhered to it firmly till 662. Since that time the Arians have nowhere constituted a distinct sect, although similar opinions have been advanced by various theologians in modern times. See ANTITRINITARIANS and TRINITY.

ARIAS, BENEDICTUS, surnamed *Montanus*, a learned orientalist, was born at Ferexenal, near Seville, in Spain, in 1527; studied at Seville and Alcala de Henares, and afterwards travelled in several countries of Europe, with the view of acquiring living languages. He accompanied the Bishop of Segovia to the Council of Trent, and on his return secluded himself in a cloister among the mountains of Andalusia. Philip II. drew him forth from his seclusion to prepare a new edition of the Polyglot Bible, which was printed at Antwerp by the celebrated printers Plantin in eight vols. folio. Of his numerous writings the best known is his Jewish Antiquities, attached to the Polyglot, and also published separately. Philip II. wished to reward him with a bishopric, but he modestly declined. He died at Seville in 1598.

ARICA, a seaport of Chili, province of Tacna, 30 miles south of the town of Tacna, with which it is connected by railway. It is still a port of some consequence, but the ravages of earthquakes have caused a great decline in its population. The chief exports are silver and silver ore, copper, bark, chinchilla skins, and alpaca wool. From this port the silver from the mines of Potosi used to be shipped for Europe. Pop. about 4000.

ARIÉGE, a department of southern France, separated from Spain by the Pyrenees. The greater part of the surface is covered by the Pyrenees and their offshoots, the highest peak, Mount Becalm, being upwards of 10,000 feet high. There are several cols leading into Spain, but the paths are difficult, and often impracticable in winter. In the northern part of the department there are fertile valleys. The principal rivers are the Ariége, Arize, and Salat, tributaries of the Garonne, but a small portion of the drainage falls into the Aude. The department contains numerous small lakes. The arable land is small in quantity, but a considerable number of sheep and cattle are reared. The manufacturing industry is considerable, but lead, copper, &c., are abundant. The chief town is Foix. Area, 1890 square miles; pop. (1901), 210,527.

ARIES (Latin, a ram), one of the twelve signs of the zodiac; the first or vernal sign. Owing to the precession of the equinoxes (see PRECESSION) the sign of Aries, that is, the first twelve degrees of the zodiac, does not correspond with the constellation Aries, but begins in the constellation Pisces, about 30° west of the original sign.

ARIETTA. See AIR.

ARIMANES. See AHRIMAN.

ARIMASPIANS, in Greek mythology, a people said to have lived in the extreme north-east of the ancient world. They are represented as one-eyed, and carried on perpetual war with the gold-guarding griffins, whose treasure they endeavoured to steal.

ARION, a Greek poet, the inventor or improver of the dithyramb, was born at Methymna, in Lesbos, and flourished about B.C. 625. He lived at the court of Periander, in Corinth, and afterwards visited Sicily and Italy. At Tarentum he won a prize in a musical contest. Having embarked in a vessel, according to the legend, with rich treasures, to return to his friend Periander of Corinth, the avaricious sailors resolved to murder him. Apollo having informed him in a dream of the impending danger, Arion, in a magnificent dress, with his lyre in his hand, went upon deck, and endeavoured to soften the hearts of the crew by the power of his music. The dolphins, attracted by the sound, assembled round the vessel, and listened to his sweet strains, though the avaricious seamen still continued unmoved. Arion then resolved to escape the murderers by a voluntary death, and threw himself into the sea. A dolphin received him on his back, and bore him safe to Mount Tænarus, whence he sailed for Corinth. The sailors, having returned to Corinth, and being questioned by Periander concerning Arion, replied that he had remained at Tarentum. Upon this he appeared before them, and convicted them of their crime, whereupon Periander caused them to be crucified. The lyre of Arion and the dolphin became constellations in the heavens. A fragment of a hymn to Poseidon, ascribed to Arion, is still extant.

ARIOSTO, LUDOVICO, one of the most celebrated poets of Italy, was born at Reggio, in Lombardy, September 8, 1474, of a noble family. His father was military commandant at Reggio and a member of the first judicial court at Ferrara. Ludovico was designed for the profession of the law; but after five years of fruitless application to it, the young man renounced law, that he might devote himself to literature. He now studied the Latin poets with great diligence, and soon became a skilful writer of Latin verse; his poems in this language indeed first made him known. Plautus and Terence furnished ideas for two comedies, the Cassaria and the Suppositi, and he also wrote sonnets and canzoni. His lyric poems, in the Italian and Latin languages, distinguished for ease and elegance of style, introduced him to the notice of the Cardinal Ippolito d'Este, son of Duke Ercole I. of Ferrara. In 1503 Ippolito employed him in his service, used his counsel in the most important affairs, and took him with him on a journey to Hungary. At Ferrara he began and finished, amid distractions of every kind, in ten or eleven years, his immortal poem, the Orlando Furioso. In 1515 the poem was printed, and immediately became highly popular. In 1517 Ariosto was invited to accompany the Cardinal d'Este on a second journey to Hungary. The unhealthy climate and the infirm health of the poet appeared to him no sufficient apology; and on declining to attend him, therefore, Ariosto lost for ever the cardinal's favour, which gradually passed from coldness and indifference to settled hatred. Ariosto was now received by Alfonso I., duke of Ferrara, the cardinal's brother, a lover of the arts, who put much confidence in him, but bestowed on him only trifling rewards, and (what seemed more like a punishment than a mark of favour) in 1521 and 1522 commissioned him to quell the disturbances that had broken out in the wild and mountainous Garfagnana. He successfully accomplished this difficult enterprise, and after three years returned to Ferrara, where he employed himself in the composition of his comedies, and in putting the last touches to his Orlando. He died June 6, 1533, and was buried in the church of San Benedetto at Ferrara, where a magnificent monument was erected over his remains. His Orlando Furioso, which is a continuation of Boiardo's Orlando Innamorato, and cannot be perfectly understood without

it, is an epic romance, full of the fairest flowers of poetry, and of freshness and spirit, in which Ariosto far excels even Tasso. The Orlando displays a splendid and inexhaustible richness of invention, and an ever-changing variety of incidents connected by the talent of lively narration. The activity of a youthful fancy animates the whole work. Ariosto exhibits a wonderful skill in interweaving the episodes, which he continually interrupts, and again takes up with an agreeable, and often imperceptible art, and so entwines them with one another that it is difficult to give a connected sketch of the contents of the poem. These qualities place him among the great masters of poetry, and have gained for him among his countrymen the appellation of *divine*. Besides this great epic, he left some comedies, satires, sonnets, &c., and a collection of Latin poems.

ARISTÆUS, in mythology, a son of Apollo, was brought up by the Nymphs. The introduction of the use of bees is ascribed to him, and gained for him divine honours. His love of Eurydice, the young bride of Orpheus, caused her death; for as she fled from him along the side of a river she received a mortal bite from a poisonous snake.

ARISTARCHUS, a Greek grammarian and celebrated critic of the text of Homer, which he endeavoured to restore to its genuine state, and to clear of all interpolations and corruptions. It was he who divided the Iliad and Odyssey into twenty-four books each, and his edition of Homer furnished the basis of all subsequent ones. He was born in the island of Samothrace, and died of voluntary starvation at Cyprus, aged seventy-two, about B.C. 88.

ARISTARCHUS OF SAMOS, a famous astronomer, between 280 and 264 B.C., who first asserted the revolution of the earth about the sun. His work on the magnitude and distance of the sun and moon is still extant. He is also regarded as the inventor of the sun-dial.

ARISTEAS, a personage mentioned in ancient Greek legends, represented as an epic poet, and said to have flourished about the time of Crœsus and Cyrus. He had the power to leave and re-enter his body, and reappeared 340 years after his reported death. He wrote an epic poem called Arimaspeia, in which he described his travels among the fabulous Arimaspians, and others. The existence of such a poem is proved by citations, but its authorship is doubtful.

ARISTIDES, a statesman of ancient Greece, surnamed the *Just*, was the son of Lysimachus, and descended from one of the most honourable families of Athens. He was one of the ten generals of the Athenians when they fought against the Persians at Marathon, B.C. 490. According to the usual arrangement the command of the army was held by each of the generals in rotation for one day. But Aristides prevailed on his colleagues each to give up his day to Miltiades; and to this, in a great measure, must be ascribed the victory of the Greeks. He was next appointed one of the archons, and his popularity excited the jealousy of Themistocles, who succeeded in procuring his banishment by ostracism. It is said that a rustic citizen, who happened to stand near Aristides in the public assembly which decreed his banishment, turned to him, without knowing who he was, and asked him to write the name of Aristides upon the shell with which he was going to vote. 'Has Aristides injured thee?' inquired he. 'No,' answered the voter, 'but I am tired of hearing him called the Just.' Aristides wrote his name, and returned the shell in silence to the voter. He left the city with prayers for its welfare about B.C. 483. Three years after, when Xerxes invaded Greece with a large army and fleet, Aristides returned to lend assistance to his countrymen, became reconciled to Themistocles, and rendered valuable service at the glorious battle of Salamis. In the battle of Platæa (479) Aristides commanded the Athenians, and had a great share in the merit of the victory. Through his influence a law was passed admitting all citizens alike to the archonship and as members of the Areopagus; and it was largely by his means that Athens obtained the headship of the maritime confederacy formed to resist the Persians. To defray the expenses of the Persian war he persuaded the Greeks to impose a tax, which should be paid into the hands of an officer appointed by the states collectively, and deposited at Delos. The confidence which was felt in his integrity appeared in their intrusting him with the office of apportioning the contribution—an office which he executed with universal satisfaction. He died at a very advanced age, probably about B.C. 468, and so poor that he was buried at the public expense.

ARISTIPPUS, the founder of the celebrated philosophical school among the Greeks called the *Cyrenaic*, from his native city Cyrene, in Africa. He flourished about 400–366 B.C. Being sent by his wealthy father Aritades to Olympia, probably to take part there in the chariot-races, he heard Socrates spoken of, and was so desirous to receive instruction from him that he immediately hastened to Athens and mingled with his disciples. He did not, however, adopt all the principles of this philosopher. Like him, he thought that we should refrain from speaking of things which are beyond human comprehension, and likewise paid but little attention to the physical and mathematical sciences; but his moral philosophy differed widely from that of Socrates, and was a science of refined voluptuousness. His fundamental principles were—that all human sensations may be reduced to two, pleasure and pain. Pleasure is a gentle, and pain a violent emotion. All living beings seek the former and avoid the latter. Happiness is nothing but a continued pleasure, composed of separate gratifications; and as it is the object of all human exertions we should abstain from no kind of pleasure. Still, we should always be governed by taste and reason in our enjoyments. As Socrates disapproved of these doctrines it was probably to avoid his censures that Aristippus spent a part of his time at Ægina, where he was when his master died. He made many journeys to Sicily, where he met with a very friendly reception from Dionysius the Tyrant. The charms of the celebrated Lais allured him to Corinth, and he became very intimate with her. (See LAIS.) He was the first of the disciples of Socrates who taught for money. After his death his doctrines were taught by his daughter Aretē, and by his grandson Aristippus the younger, by whom they were systematized. Other Cyrenaics compounded them into a particular doctrine of pleasure, and are hence called *Hedonici*. The time of his death is unknown, and his writings are lost. Various sayings of his have been preserved. For instance, being asked why philosophers frequented the houses of the great, while the great disregarded those of the philosophers, he replied, 'Because the former know what they want, and the latter do not'. He engaged a lawyer to plead for him, for the same reason, he said, as when he had a great supper he always hired a cook.

ARISTOBULUS, a Jewish philosopher who flourished at Alexandria about B.C. 150, during the reign of Ptolemy Philometor, and is supposed to have been the teacher of Ptolemy Euergetes. He has been credited with the authorship of an allegorical and philosophical commentary on the Pentateuch, of which only fragments have been preserved in the

writings of Eusebius and Clement of Alexandria. The object of this work is to show that the Peripatetic and other systems of Greek philosophy were based on the Pentateuch. It is now generally agreed that this work is the production of an anonymous author of a later age.

ARISTOCRACY (from Greek *aristos*, best, and *kratein*, to rule), a word originally applied to that form of government by which the wealthy and noble, or any small privileged class, rules over the rest of the citizens. It is also applied collectively to the titled and the wealthy, or to the former alone. See GOVERNMENT.

ARISTOGEITON, a citizen of ancient Athens, whose name is rendered famous by a conspiracy which he formed in conjunction with his friend Harmodius against the tyrants Hippias and Hipparchus, the sons of Pisistratus. They succeeded in killing Hipparchus (514 B.C.), but not being seconded by the people, Harmodius was despatched by the guards, and Aristogeiton secured. Hippias instituted a severe investigation into the plot, and tortured Aristogeiton to discover his accomplices, upon which he is reported to have named all the best friends of the tyrant in succession, and they were immediately put to death. On being asked by Hippias if there were any more, 'There now remains', said Aristogeiton with a smile, 'only thyself worthy of death'. Hippias being expelled three years after, the Athenians paid the greatest honours to the two friends Harmodius and Aristogeiton, placing in the forum their statues by Praxiteles, singing hymns to their praise at the Panathenæa, &c.

ARISTOLOCHIA. See SUPP.

ARISTOPHANES, the only Grecian comic dramatist of whom any plays have been preserved entire, was the son of a certain Philippus, a landed proprietor of Ægina, and was born at Athens probably about the year 448 B.C. He appeared as a poet in the fourth year of the Peloponnesian war (B.C. 427), and having indulged himself in some sarcasms on the powerful demagogue Cleon was accused by the latter of having unlawfully assumed the title of an Athenian citizen. In defending himself before the judges he is said to have quoted the verses which Homer puts into the mouth of Telemachus, referring to his own father as an Athenian citizen:—

> My mother says he is my father, myself of the fact have no knowledge;
> Since no one could ever yet tell of himself who it was that begot him'.

The same accusation was twice renewed against him, but he succeeded in repelling it both times. In 424 he again attacked Cleon in his comedy of The Knights, in which he himself acted the part of the Athenian demagogue, because no actor had the courage to do so. The earliest of his extant plays was The Acharnians, which was brought out in 425. He had three sons, Philippus, Araros, and Nicostratus, all of them comic dramatists of some note. This little remains to us of the life of Aristophanes, who was distinguished among the ancients by the appellation of *the Comedian*, as Homer was by that of *the Poet*. He appears to have died not later than 380. Of fifty-four comedies which he composed eleven only remain; and in these, without doubt, we possess the flower of the ancient comedy; but in order fully to enjoy them, and not to be offended by the extravagances and indecencies with which they abound, we must be intimately acquainted with ancient customs and opinions. The purity and elegance of his language, which is regarded as a model of the Attic Greek dialect, the skill and care displayed in the plan and execution of his pieces, the wealth of lyric power displayed in his choral odes as well as the overflowing richness of his comic genius, and the various other excellences of his dramas, have gained for Aristophanes the fame of a master. His wit and humour are as inexhaustible as his boldness unrestrained. The Greeks were enchanted with the grace and refinement of his writings; and Plato, the comedian, said the Graces would have chosen his soul for their habitation. 'According to our ideas of decorum,' says a modern scholar, 'we should esteem the soul of Aristophanes a fitter residence for the licentious and malicious satyr, or at least we should call him, with Goethe, the *spoiled child of the Graces*'. His grossness must be admitted, but we should remember how different are the standards by which matters of this kind have been measured at different times. Aristophanes was a patriot as well as a poet, and strongly conservative in his leanings. In his plays there was a constant reference to the manners, actions, and public characters of the day. He strongly inveighed against the Peloponnesian war, which he attributed to Pericles and Aspasia. The teaching of the Sophists was also opposed by him, as subversive of religion and morality. On both political and moral grounds he was a strong advocate for ancient discipline, manners, doctrines, and art; hence his sallies against Socrates in The Clouds, and against Euripides in The Frogs and other comedies. The freedom of ancient comedy allowed an unbounded degree of personal satire, and Aristophanes made so much use of this that nothing which offered a weak side escaped his ridicule. He feared the Athenian populace so little that he personated them under the figure of a wretched old man called Demos. He incessantly reproached them for their fickleness, their levity, their love of flattery, their foolish credulity, and their readiness to entertain extravagant hopes. Instead of being irritated, the Athenians rewarded him with a crown from the sacred olive-tree, which was at that time considered an extraordinary mark of distinction. Excessive freedom in dealing with public men and public measures was a characteristic feature of the 'old' comedy of Greece. After the Peloponnesian war this licentiousness was much restrained, and in the year 388 B.C. it was forbidden by law to name living persons on the stage. At that time Aristophanes produced, under the name of his eldest son, the Cocalus, his last play. With this what is known as the 'middle' comedy began, to be followed afterwards by the 'new'. The names of his extant plays are The Acharnians (B.C. 425, first prize), The Knights (424, first), The Clouds (423, first), The Wasps (422, second), The Peace (421, second), The Birds (414, second), Lysistrata (411), Thesmophoriazusæ, The Frogs (405, first), Ecclesiasuzæ (393), and Plutus (388). Among editions of his comedies may be mentioned those of Bekker (London, 1829), Dindorf (various editions), Bergk (1867), Blaydes (1886), Holden (1887). There are many English translations in prose and verse, the best (complete) being Hickie's in prose and B. B. Rogers' in verse (with text). Frere's verse translations of The Frogs, Acharnians, Knights, Peace, and Birds are exceedingly good, as are also Thomas Mitchell's of The Acharnians, Knights, Clouds, and Wasps.

ARISTOTLE, one of the greatest names in the history both of science and of philosophy, and the founder of the Peripatetic school, was born in 384 B.C. at Stageira (or Stagira), a seaport of Chalcidice, in Macedonia (hence he is designated as The Stagirite). His father, Nicomachus, was physician to Amyntas II., king of Macedonia. He was not of Macedonian but of Greek origin, being of the race of the Asclepiadæ, who claimed to be descended

from Æsculapius, and whose hereditary profession was that of physicians. It is said to have been a tradition in the family that the art of dissection was regularly taught in it from father to son.

The authentic materials for the life of Aristotle are very slender. The principal life of him in ancient times is that of Diogenes Laertius, who has borrowed from sources of very various values. He gives a chronological summary from Apollodorus (B.C. 140), of which the following are the particulars:—That Aristotle was born in B.C. 384; that he passed twenty years, thirteen of them consecutively, with Plato at Athens; that the year following the death of Plato (who died in 347) he came to Hermias, ruler of Atarneus and Assos, in Bithynia, with whom he resided three years; that he was at Mitylene in 345; he went to Macedon, to take charge of the education of Alexander, in 343; he came to Athens in 335, and conducted a school in the Lyceum for thirteen years; he retired to Chalcis in 322, and died there shortly after of disease (not by poison). We subjoin the details, more or less authentic, by which from various sources this meagre outline, which is generally believed to be trustworthy, is filled in, without knowing what degree of credit is due to them.

Aristotle had lost both his parents before he was seventeen, and had been left, not unprovided for, under the guardianship of Proxenus of Atarneus, a friend of his father. About the age of seventeen he came to Athens to complete his education. At this very time Plato would be absent on his first visit to Sicily, after the opening of the Academy. A duration of three years is assigned to his absence. Aristotle, having ample means for the purchase of books, employed this interval in studying the earlier systems of philosophy, and conversing with other disciples of Socrates, as a fitting preparation for the instructions of the great master. After becoming a pupil of Plato that philosopher soon discerned his ability, and called him 'the intellect of the school'. He called his house the house of the reader, and said that he required the curb and not the spur. During his connection with Plato, Aristotle is by some believed to have taught philosophy, but the general opinion is that at this period he only taught rhetoric in opposition to Isocrates. On the birth of Alexander, Philip wrote him that he thanked the gods not so much that they had given him a son as that they had permitted him to be born in the time of Aristotle. The letter is extant, and consequently the fact of its having been written is undoubted; but as Aristotle was at this time a disciple of Plato, and had written none of the works which have given him so exalted a fame, it is difficult to give Philip credit for the discernment implied in writing it. It seems inspired by the knowledge and reverence which belonged to later times. Various stories are told of quarrels between Plato and Aristotle. That Aristotle had, during the lifetime of Plato, formed opinions widely divergent from those of his master, and that he gave open expression to them in debate with him, may be regarded as certain, but further than this the evidence does not go. Each was probably too well assured of the soundness of his own opinions, and had too great a respect for the ability of his opponent, to make their differences the cause of lasting offence. That Aristotle should have remained at Athens till the death of Plato and then left it has given rise to various conjectures. It can scarcely be supposed that he was offended at being passed over in the appointment of a successor to the Academy, for which his differences with Plato could hardly leave him any hope; but it is remarkable, if he was formerly restrained by respect for Plato, that he did not now open a school on his own account. Most likely the fame of Plato was at this time so great that there was little chance of success for a rival teacher.

At the time when Aristotle left Athens Philip had attacked the Greek cities of Chalcidice, and had destroyed Stageira. On his journey to Asia, Aristotle was accompanied by Xenocrates, another disciple of Plato, who afterwards presided over the Academy when Aristotle opened his own school in the Lyceum. On the death of Hermias, ruler of Atarneus, who was killed by the Persians, Aristotle retired to Mitylene, accompanied by his wife Pythias, the niece and adopted daughter of Hermias. By her Aristotle had a daughter of the same name, whom he married to Nicanor, son of Proxenus, whom he himself adopted. He wrote a commemorative poem on Hermias, which afterwards caused him some trouble. In 343 or 342 he was summoned to the court of Philip to take charge of the education of his son. Philip rebuilt for him the city of Stageira, and caused a gymnasium to be erected in a grove for the use of his pupils. According to Plutarch, Casander, the son of Antipater, Marsyas, brother of (King) Antigonus, Callisthenes, Theophrastus, and other noble youths, were co-pupils with Alexander. Alexander enjoyed the instructions of Aristotle for four years uninterruptedly, and formed an enthusiastic and lasting attachment to his teacher. In the light of the subsequent history of Alexander, Aristotle is supposed to have specially trained him to be the leader of Greece. He is said to have specially prepared a recension of the Iliad for him. He imparted to him the principles of his own philosophy, taught him science and medicine, politics and ethics. After Alexander's appointment as regent (B.C. 340) his connection with Aristotle did not wholly cease. When Alexander ascended the throne Aristotle returned to Athens, a striking and unexplained circumstance, quitting Macedonia for ever. Some writers suppose that he accompanied Alexander in his early campaigns, and thus acquired opportunities for that extensive observation of nature, and particularly of animals, which appears in his works, but others regard this as fabulous. Aristotle established his school in the Lyceum, a gymnasium attached to the temple of Apollo Lyceius, which was assigned to him by the state. Possibly he may have cherished the project of teaching in Athens, and his late charge had given him sufficient weight with the Athenians to enable him at length to make the attempt. He delivered his lectures in the wooded walks of the Lyceum while walking up and down with his pupils. From the action itself, or more probably from the name of the walks (*peripatoi*), his school was called Peripatetic, a name which is not without symbolic significance. Pupils gathered to him from all parts of Greece, and his school became by far the most popular in Athens. The statement that he had two circles of pupils, the *exoteric* and the *esoteric* (or acroamatic or acroatic), has given rise to much criticism and controversy. The word exoteric, from which the other is educed, is found eight or nine times in the writings attributed to Aristotle. The meaning it usually bears is something external to the scientific treatment of a subject, as a popular exposition. It is also applied by Aristotle to his dialogic works. In an alleged reply to a complaint of Alexander, that he had made public the doctrines of his philosophy, he is said to reply that the acroatic books had been published and yet not published, for they were intelligible only to those who were initiated into philosophy. On one hand, it has been held that Aristotle published during his lifetime popular discourses with a view to make way for his doctrines in Athenian society, then impregnated with

Platonic theories, and that these are called exoteric in contradistinction to those in which are embodied his matured opinions. Others consider the word exoteric as purely general in its meaning, as above indicated, and as having no special reference to his own writings or teaching. It was during the time of his teaching at Athens that Aristotle is believed to have composed the great bulk of his works. He is said to have been liberally supplied by Alexander with the means of pursuing his investigations (having at one time received the large sum of 800 talents), and it is evident that some such support was indispensable to the wide range of his inquiries. It is also said, and may readily be believed, that he employed his various pupils in different investigations subordinate to his designs. On the death of Alexander a revolution occurred in Athens hostile to the Macedonian interests with which Aristotle was identified. He was accused of impiety, on the ground of the hymn he had addressed to his friend Hermias, whom it was alleged that he had deified. Knowing that innocence was no protection, Aristotle retired to Chalcis, saying he desired to spare the Athenians another crime against philosophy (referring to the execution of Socrates). He was condemned to death by the Athenians in his absence. According to other accounts he had retired to Chalcis before the death of Alexander. There are several accounts of Aristotle's having put an end to his own existence, but they receive no credit. Before his death he indicated that Theophrastus was to be his successor. The exact date assigned to his death is the beginning of August, 322. By a slave with whom he lived after the death of his wife, Aristotle left a son, Nicomachus.

The works of Aristotle have had a singular history, which is involved in as great perplexity as that of his own life. According to the story told by Strabo he bequeathed them to Theophrastus. Theophrastus, with Eudemus, Phanias, Straton, and other disciples of Aristotle, amended and continued them. At the death of Theophrastus, thirty-five years later, he left them to Neleus, an Aristotelian, who took the whole collection to Scepsis in Asia Minor. His heirs, to prevent their seizure for the royal library of Pergamus, concealed the manuscripts in a vault. About 100 B.C. they were brought out and sold to a book-collector, Appelicon, who brought them to Athens. In B.C. 86, when Sulla took Athens, they were brought to Rome, where the works were inspected by various Greek philosophers, and about 50 B.C. Andronicus of Rhodes put the works and various fragments together and classified them according to a systematic arrangement. While some credit is generally attached to this story, the degree of importance attached to it by different critics is very different. While some hold that it was only a copy of the works of Aristotle that was thus buried and brought to light, others believe that it was the original manuscripts of the principal works themselves. According to this theory nothing was known of the greatest works of Aristotle till the edition of Andronicus, while the works previously known were the lighter works published during his lifetime, which, being excluded from the edition of Andronicus, are now lost. There are thus two literary Aristotles, an older and a more modern, distinct from each other. This is the view adopted by Grote and by Sir Alexander Grant. The latter remarks: 'Strabo says expressly that 'all his writings, except a few of a more popular character', had been lost; and in accordance with this Cicero says that 'even philosophers know nothing of Aristotle, though they ought to have been attracted by the incredible sweetness of his diction'. The latter part of this remark may seem surprising, for it is not in the least applicable to any of the works of Aristotle that have come down to us. But Cicero is evidently referring to the Dialogues which were read, admired, and attributed to Aristotle in the days before the edition of Andronicus became known.' Others hold the opinion that the principal works of Aristotle had already been diffused by means of copies before the burial of what may have been the original manuscripts, and that perhaps only two or three additional treatises may have been added to our stores by their recovery. The former opinion seems to involve the difficult supposition that the followers of Aristotle, including his own son, who are acknowledged to have supplemented his works, had either no opportunity or no inclination to give them to the world, or that the public had no curiosity about them.

It is generally acknowledged that the present system of arrangement of Aristotle's works is founded on that of Andronicus. The writings attributed to Aristotle in ancient and modern times are very numerous. Andronicus estimated the number of separate works at 1000, and the large collection we at present possess is said not to exceed in bulk a fourth of the whole. It is also remarkable that the three ancient catalogues extant of Aristotle's works differ irreconcilably with each other, with the quotations of ancient writers, and with the titles of the extant works. The catalogue given by Diogenes Laertius enumerates 146 works, not one of which corresponds in name with any of the treatises at present extant. The partial explanation is that the titles sometimes apply to sections, sometimes to entire works, and that various titles are given to the same book. With regard to the quantity of Aristotle's writings, it is known, as already hinted, that the writings of Aristotle have for similar reasons undergone a similar process with the writings of Hippocrates, and that there is an Aristotelian as there is a Hippocratic collection. The Aristotelian collection does not, indeed, extend over so great a length of time as the Hippocratic, the principal commentators of Aristotle being his immediate followers; but the additions and emendations of his followers are so blended with his works that they can only be distinguished as a work of criticism, and distinct works of his immediate followers and of later Aristotelians were also included in the collection. Thus, as in the case of Hippocrates, we have the same work (as the Great Ethics) regarded by one critic as a preliminary draught, and by another as a later paraphrase. The works of Aristotle are generally divided into logical, theoretical, and practical. The logical works are comprehended under the title Organon (instrument). They treat of the methods of investigation by which knowledge is arrived at. Under this head we have among others the Katēgoriai or Categories (Prædicamenta), which treats of the generic ideas, species, substance, quantity, quality, relation, time, place, &c.; its genuineness is doubtful; On Interpretation (De Interpretatione), a sketch relating to philosophical grammar, also doubtful. The logic proper consists of Prior Analytics (Analytica Priora), two books; Posterior Analytics (Analytica Posteriora), two books; Topics (dialectics), eight books; On Sophistical Refutations (on the fallacies of the Sophists), all considered genuine. The theoretical works are divided into physics, mathematics, and metaphysics. Belonging to the physics are eight books of A Discourse on Physics, containing the general principles of Physical Science (genuine, probably with admixture); On the Heavens; On Generation and Destruction (De Generatione et Corruptione), two books; Meteorology, four books, all considered genuine.

On the Universe (De Mundo), in a letter to Alexander, is spurious. The Investigations on Animals (mistranslated Historia Animalium), nine books; Peri Zōōn Moriōn, on the parts of animals, four books; Peri Zōōn Geneseōs, on the generation of animals; Peri Zōōn Poreias, on the locomotion of animals; and Peri Psuchēs, on the soul, are all genuine. With the last are connected genuine treatises on memory, sleep and waking, dreams, and divination, forming a complete treatise under the Latin title of Parva Naturalia. In mathematics there are two treatises, On Indivisible Lines and On Mechanical Problems, which are probably mixed or spurious. The metaphysics consist of fourteen books. The title (Ta Meta ta Phusika, Things coming after the Physics) is the invention of an editor; the work is genuine, but with considerable admixture. The practical works embrace ethics, politics, economics, and treatises on art. In ethics there are the Ethika Nicomacheia or Nicomachean Ethics (in ten books), genuine, with admixture; Ethika Eudēmika, seven books, a paraphrase by Eudemus; Great Ethics, spurious; Peri Aretōn kai Kakiōn, on virtues and vices, spurious; Politikē Akroasis or Discourse on Politics, eight books (genuine); Œconomics, two books, partly or wholly spurious. The art treatises, On Poetry and On Rhetoric—Peri Poiētikēs and Technē Rhētorikē—three books, are genuine. For his Politics he made a collection of monographs on the constitutions of various states, the chief being the Politeia Athēnaiōn, first published as recently as 1891, from a British Museum papyrus found in the Fayoum. Among the lost works of Aristotle are the dialogues and others to which the term exoteric is applied, and which were published during his lifetime. Some of the earlier writings, though inferior in intrinsic value to his later works, possess a historical and philosophical interest of the highest kind as containing the links of transition between the philosophy of Plato and that of Aristotle. Aristotle's style is not attractive: it has neither the grace of Plato's nor even the elegance common to Greek writers.

One of the most remarkable circumstances in Aristotle's career is the late period at which he commenced teaching. Had he been a true disciple of Plato, even though differing from his master in the development of his doctrines, his reticence would have been natural; but his rejection of the doctrine of ideas puts too great a distance between him and his predecessor to allow of his silence being satisfactorily explained by mere deference for Plato's teaching. Aristotle is described as short and slender of make, with small eyes, and a sarcastic expression of countenance; his whole demeanour was distinguished by vivacity, and his powers of popular eloquence and persuasion were considerable. He also bestowed great care on his dress and person. This is not the sort of character from which excessive caution or modesty would be expected, or who would be likely to be overburdened with veneration. That he did not teach publicly in Athens during the life of Plato is probable, as there is no mention of his pupils, but that he may have attempted, probably with little success, to influence the circle of Plato, and that he communicated his principles to his own friends, is also likely enough; the want of encouragement, or the vastness of his views, and the exceedingly laborious nature of his method, may have prevented him from going further. Aristotle not only treated Plato with the highest respect, but displayed a truth-loving candour in his dealing with opponents generally. It was part of his method to give due consideration to the opinions of previous inquirers as affording additional material for the formation of his own. Aristotle was in fact the type of the man of science, as Plato was of the philosopher. His principle was to begin with external observation and the accumulation of facts, and proceed gradually by strict induction to his conclusion. There were men of science before Aristotle, but it may truly be said that the application of a rigid method of investigation to all branches of human knowledge, which has done so much for modern science, originated with him. This is not the less true that the ignorance of subsequent ages misinterpreted his methods, and abused the zeal and completeness with which he pursued them, so far as to mistake the collections of Aristotle for the stores of nature herself. His influence may also be traced through the Macedonian conquerors in the foundation of the great schools of philosophy and science in Alexandria, which have done so much for the subsequent enlightenment of the world.

Aristotle took the philosophy of Plato on its weak side, its artificial cosmogony, and the inadequate place assigned by it to the observation and study of nature. But if Plato did injustice to science in assigning it to the region of conjecture and uncertainty, Aristotle did less than justice to philosophy in submitting it to the method of science. Nothing in Plato's ideal world had any reality for him which did not succeed in manifesting itself to external observation. Aristotle did not embrace a mere sceptical empiricism; but pursuing his investigations from without, and by the regular approaches of science, he could not reach a philosophical unity of doctrine: the ground to be covered by such a method is too great for finite resources. The task and the method of philosophy are different. It is with man himself, as an intelligent being, it has to do as the direct object of its inquiry, and with nature only as it serves to throw light on his position. The origin, nature, and range of man's intellectual powers, his present duties and his future prospects, are the problems of philosophy. Upon these questions the external observation of nature can only throw an indirect, and without philosophical interpretation a dubious, light. The problems of philosophy are for every age alike, and must have an immediate answer; the problems of science may be postponed from age to age, and wait a gradually accumulating knowledge. To assume that the former must await the determination of the latter is to assume that man has no internal light to guide him, and the common observation of nature no validity; and is accordingly to prejudge the problems of philosophy. Aristotle himself was too much under the influence of Plato to abandon the proper aims of philosophy, though he missed its proper method; but his school soon degenerated into one of mere empiricism. Theophrastus doubted the existence in man of anything beyond the life implied in mere animal organism.

Aristotle's works were first printed in a Latin translation, with the commentaries of Averroes, at Venice in 1489; the first Greek edition was that of Aldus Manutius (five vols. 1495–98). After the Cartesian revolution in philosophy the works of Aristotle fell into comparative neglect, from which they were first revived by the study of the history of philosophy, and in particular by the treatment of it by Hegel, since whose time they have received ample study and illustration in Germany. The most important modern edition is that of Bekker, carried out under the auspices of the Academy of Sciences at Berlin in 1831, in four vols., with a Latin translation; a fifth containing the fragments and index, edited by Bonitz, was published in 1871. A valuable edition has been published by Didot (Paris, 1848–69). Single works have been frequently edited. The latest work of importance on Aristotle is that of Grote, published in

1872. See also Lewes's Aristotle, a chapter from the History of Science; Blakesley's Life of Aristotle; Zeller's Aristotle (English trans., 1888), &c. There is no complete English translation of Aristotle's writings. Bohn's Classical Library contains translations of the Ethics, Politics and Economics, Metaphysics, History of Animals, Organon, and Rhetoric and Poetics.

For an account of the philosophy of Aristotle see PERIPATETICS.

ARISTOXENUS OF TARENTUM, a musician and philosopher, born about B.C. 324, studied music under his father Mnesias, and philosophy under Aristotle. He aspired to be the successor of the latter, and never forgave him for having preferred Theophrastus. According to Suidas he wrote 453 works, but the only one which has been preserved is one in three books on the Elements of Harmony. Unlike Pythagoras, he banishes number and calculation from music, and makes the ear the sole judge of the selection and succession of sounds. He endeavoured to apply his musical knowledge to philosophy, and especially to the science of mind, but it only appears to have furnished him with far-fetched analogies and led him into a kind of materialism.

ARITHMETIC (from the Greek *arithmos*, number) is primarily the science of numbers. As opposed to algebra it is the practical part of the science. The idea of separating the theoretical from the practical treatment of numbers, and of expressing the former by abstract symbols, capable of declaring laws but not of performing actual operations, is necessarily of later origin than the performance of arithmetical operations themselves. When this separation has taken place arithmetic becomes reduced to a mere mechanical series of operations. Every law of numbers is capable of being expressed algebraically, and the expression of these laws constitutes in abstract form the rules by which arithmetical operations are performed. The rules of arithmetic properly so called are the practical directions for performing particular operations. Although the processes of arithmetical operations are often highly complicated, they all resolve themselves into the repetition of four primary operations, addition, subtraction, multiplication, and division. Of these the two latter are only complex forms of the two former, and subtraction again is merely a reversal of the process of addition. It follows from this that the one thing indispensable for making a thorough practical arithmetician is exhaustive drill in these four fundamental processes, and especially in the elementary one of addition. This is often missed from over-ambition. If it is considered that all the operations in these rules are mere repetitions of the elementary steps, it will be seen that all that is necessary to afford facility in these operations is a thorough acquaintance with and perfect command of all the relations of numbers from 1 to 100. Instead of fatiguing the attention of the learner, imperfectly acquainted with elementary numbers, with long exercises in addition and other rules, let as much time be spent in drilling him in his elementary steps. Let him learn the multiplication table by addition as far as the units, which alone are indispensable, numbering the results and reversing the process for subtraction and division. Let the remaining numbers from 1 to 100 be combined, dissected, added, subtracted by as many symmetrical processes as can be devised, as, for example, finding the complement of 100 for each number from 1 to 99 in succession, finding all the prime numbers, and all the factors contained in other numbers from 1 to 100. Let all these operations be familiarized by repetition, taking them first methodically, and then arbitrarily, till there is nothing left with which he is not familiar, then let him repeat the same operations from 200 to 300, and from 300 to 400, to show the absolute identity of the process. Much greater firmness and confidence will be acquired in this way than by indiscriminate drill. Practice, for attaining speed in long operations of simple addition, subtraction, multiplication, and division, should follow, and should be kept up at intervals as long as the learner desires to maintain proficiency in arithmetical practice.

Some knowledge of arithmetic is necessarily coeval with the first dawn of human intelligence, and it would be useless to seek the origin of this science elsewhere than in the earliest rational observation of the objects of sense. Still the conception of number must have long existed in many human societies, as we still find it with most barbarous peoples, in a very crude and elementary form. The earlier civilized nations, however, possessed means of reckoning adequate to the ordinary uses of civilized life, and even applicable to some scientific purposes, though the progress in arithmetic was much slower than from the elementary nature of the subject might have been anticipated, a clear indication that in human progress the practical and sensible take long precedence of the theoretical and speculative.

Though the origin of arithmetic is lost in antiquity, yet partly from the slowness of its progress, partly from the indications of language and other memorials, the main steps of its development into a scientific form can be tolerably satisfactorily traced.

Simple as our present mode of enumeration appears it is divisible into a number of different steps, each of which admitted of separate invention, and each has in fact been reached slowly, and not without difficulty and difference of practice. The mode of enumeration by tens involves two inventions, one of early the other of late attainment. The names of numbers in almost all languages, particularly the Indo-European, are formed upon a decimal system, that is to say, the re-enumeration in successive ranks of units, tens, hundreds, and the combination of the different ranks according to their respective scales of value. Thus while we have independent names for numbers up to ten, we give after that independent names only to the decades twenty, thirty, &c., adding units, twenty-one, twenty-two, &c., to make up intermediate numbers, and in like manner with hundreds and higher numbers. The uniformity of this practice has raised the question as early as the time of the Greek philosophers whence it originated. This question is put in the Problems of Aristotle, and has been rediscussed with the same result by Buffon. First theoretical reasons are assigned: ten is the perfect number, it contains odd and even, the square and the cube, &c., but these reasons are justly set aside. It seems self-evident that practical and not theoretical reasons were most likely to influence the framers of language; and inquiring what practical reasons could influence such a uniformity of practice, the decision is that it has arisen from the primitive practice of counting on the fingers and toes. If the facts already stated stood alone this decision would not be satisfactory. Why should ten instead of five or twenty be the unit adopted on this principle? Those who support the theory are bound to account for the uniformity of practice, otherwise the more natural inference will be to an original unity in the languages adopting the practice. The necessary link of evidence has, however, been found. It has been shown that there were primitive enumerations by five and twenty as well as by ten, and in languages where the decimal system has prevailed there are still remains of the other systems. Thus the Roman V, X, L, C, represents both the quinquennial and the decimal systems, and the quatre-vingts of the French

is a relic of the Gallic use of the vigesimal system. In the Aztec system of enumeration units are represented by nails, and intermediate twenties by feathers or other symbols.

A satisfactory proof that the decimal system has been adopted on arbitrary and not on scientific grounds is afforded by another circumstance in the construction of language. Besides the systems already mentioned there is evidence in language of a duodecimal system. But this system has evidently grown up later and has left more superficial marks of its presence. The reason of this can easily be explained. The origin of this system is commercial. In commercial transactions the most convenient numbers are those which can be most easily split, and which form the most numerous integral fractions. In this way ten is the most impracticable even number possible. It will only divide by five or two, while twelve divides into twos, threes, fours, and sixes. As this is the real test of the practical value of a unit, there is the most convincing evidence in the subsequent introduction of twelve, if we are correct in attributing it to mercantile convenience, that the earlier unit was an arbitrary and conventional standard adopted in ignorance of arithmetical proportions, and not a theoretical standard based on a subtle analysis of the properties of numbers. It may be observed also that if, as many desire, there should be established a uniform decimal system of weights and measures, it will always encounter a formidable rival in the superior practical convenience of the dozen and the gross over the corresponding ten and hundred of the decimal system. These will arise spontaneously in spite of restrictive laws, and having their root in the nature of numbers they cannot permanently be suppressed. Charles Fourier severely rebukes the primitive man for misunderstanding the use of the counters with which nature has furnished him. He ought to have seen, he says, that these lend themselves exclusively to a duodecimal system. The thumb stands apart as a pivot or indicator, while the four fingers are each divided by the joints into three sections, undoubtedly reckoning twelve. It would also appear that by placing nails on the uppermost sections nature intended the primitive man to reckon fractions. The Chinese had actually an articulate notation, including the joints of the thumb.

Our system of enumeration involves two principles, the use of signs having specific values as units, and the recognition of a regularly ascending scale of multiplication in the successive ranks of figures placed in line, whereby each acquires, in addition to its integral value, a value of position due to the multiplier of the rank to which it belongs. Thus in writing the integral number 321, the multiplier of the first figure to the right is 1, of the second 10, of the third 100. All this would seem to be implied in what has already been said of the common nomenclature of numbers; but however close the inference may seem to us, it is so far from being explicit in itself that the most enlightened nations of antiquity appear never to have arrived at it. The earliest arithmetical signs appear to have been hieroglyphical, but the Egyptian hieroglyphics were too diffuse to be of any arithmetical value. The units were successive strokes to the number required, the ten an open circle, the hundred a curled palm-leaf, the thousand a lotus flower, ten thousand a bent finger. The letters of the alphabet afforded a convenient mode of representing figures, and were used accordingly by the Chaldeans, Hebrews, and Greeks. The Greek system was borrowed from the Hebrew through the Phœnicians, and their features are nearly identical.

The first nine letters of the Hebrew alphabet represented the units, the second nine tens, the remaining four together with five repeated with additional marks, hundreds; the same succession of letters with added points was repeated for thousands, tens of thousands, and hundreds of thousands. The Greeks followed the same system up to tens of thousands. They wrote the different classes of numbers in succession as we do, and they transferred operations performed on units to numbers in higher places; but the use of different signs for the different ranks clearly shows a want of full perception of the value of place as such. The Greeks were tolerable arithmeticians. They had also great mathematicians, who placed no limit to their study of the properties of numbers. Pythagoras is the first scientific arithmetician of whom we have any knowledge. Numbers became in his school the interpreters of all the arcana of nature. Pythagoras called prime numbers, or those which are indivisible by any integral number, linear numbers; numbers which contain two factors, superficial numbers; and those which contain three, solid numbers. The square roots of numbers which have not integral roots are irrational numbers. It was by arithmetical considerations that Pythagoras was led to his famous proposition of the square of the hypothenuse of a right-angled triangle being equal to the squares of the sides, and from this proposition he came to form acquaintance with irrational numbers. There is a tradition that Pythagoras used in his calculations a system different from the ordinary Greek notation, and it has been conjectured on very slender grounds that he was acquainted with the modern method; but there is no real evidence of this either in his case or in that of any other ancient. The Greeks adopted the letter M as a sign for 10,000 and by combining this mark with their other numerals they could note numbers as high as 100,000,000. Archimedes gave the system indefinite extension by applying its final limit M^2 as the unit of a new system, employing the same signs as before. The numerals of the second order were written to the left of those of the first and separated from them by a point. A third order was begun with M^4, a fourth with M^6, &c. As there were eight places in each order of figures, Archimedes called this the system of octades. Apollonius adopted M instead of M^2 as the basis of the second order, thus reducing the different orders to four figures.

The Roman numerals are of a very retrograde character as compared with the Hebrew and Greek, and were almost useless for purposes of computation. From one to four were represented by vertical strokes I, II, III, IIII, five by V, ten by X, fifty by L, one hundred by C, afterwards C, five hundred by D, a thousand by M. These signs were derived from each other according to particular rules, thus V was the half of X, Λ being also used; L was likewise the half of C. M was artistically written ↀ and cIↃ, and IↃ, afterwards D, became five hundred. ccI represented 5000, ccIↃↃ 10,000, IↃↃↃ 50,000, cccIↃↃↃ 100,000. They were also compounded by addition and subtraction, thus IV stood for four, VI for six, XXX for thirty, XL for forty, LX for sixty. This cumbrous and limited notation, which still stands with great dignity in monuments, titles, &c., indicated a very limited capacity for calculation, and indeed the Romans did not make use of these symbols in calculation, but were compelled to resort to a more primitive mode.

This mode, called by Humboldt 'palpable arithmetic', has been used in substantially the same way by the Chinese, the Etruscans, and the Romans, the latter having borrowed it from the Etruscans. The Roman instrument of calculation was the well-known abacus. (See Abacus.) The Chinese instrument is called Swan-pan. It was imported into Russia

by the Tatar conquerors. It is an oblong frame with rows of balls arranged on parallel cords stretched across it; in fact, almost identical with the abacus. In using these instruments as numerators the first line represents units, the second tens, the third hundreds, &c. The Chinese instrument is divided in the middle by a perpendicular bar. Five balls are strung on each bar on the left, and two, equivalent to ten, on the right. The Chinese use any wire for units, counting both up and down, and thus practically adopting the decimal system. Different coloured balls may be used to distinguish the different ranks. The Romans also used a sanded table on which they drew parallel lines and placed counters on them, which they employed in the same manner. The abacus and the sanded table were transmitted by the Romans to other European populations, and they continued in use up till the seventeenth or eighteenth century. It seems surprising that a civilized people, in noting the results of such calculations, did not hit upon a mode of notation analogous to their method of calculation.

Our mode of enumeration did not come to us from a classical source, nor does its invention do much credit to human ingenuity. It appears to have originated simply in a contracted mode adopted in various countries of the East of writing the spoken enumeration common to them with the classical nations. The contraction consisted at first merely of having specific signs for the numbers in the scale of units and using them with a contraction for the names of the numbers of higher value, as we might write 4 T (housand), 3 h (undred), 4 t (ens), 6 u (nits), 4 T, 3 h, 4 t, 6 u. This is the mode of written enumeration adopted in Tamil. The Chinese improved on this by separating the signs of numeric value from their coefficients, thus, $\overset{4}{\mathrm{T}}\ \overset{3}{\mathrm{h}}\ \overset{4}{\mathrm{t}}\ \overset{6}{\mathrm{u}}$. Here from the repetition of the same numeral signs the value of position is obviously suggested, and it only remained to invent a *cipher* to occupy vacant places, and to omit the coefficients rendered superfluous from their systematic occurrence, in order to make a regular scale of values ascending by position. This change was first introduced in Sanskrit. It was borrowed by the Mohammedan Arabs on their conquest of India, and by them transmitted to Europe. Our numerals are obviously based upon the Devanagari or Sanskrit characters.

If we are disposed to smile at the laborious nature of this invention we have only to look at a later chapter in the history of arithmetic. It appears that when the Arabic numerals (which ought rather to be called the Indian numerals) were introduced into Europe they were used only to represent integral numbers. It remained to be discovered that in the same way as 1, 10, 100, mean, one, ten, a hundred, ·1, ·01 may mean one-tenth and one-hundredth, and that the scale of decimal fractions thus constructed may be carried out indefinitely and combined or dissected on the very same principles as whole numbers. The first use of decimals has been by some ascribed to Regiomontanus towards the close of the fifteenth century, by others to Stevinus (La Disme, 1585), and so slowly was their use established that Biot and others attribute their invention to Napier in the seventeenth century. They were not in common use when the first tables of logarithms were constructed. Naturally the same idea must have occurred to many arithmeticians, but the clogs with which it was encumbered and the difficulties it encountered can only be understood from actual details. Professor De Morgan has given an account of the discovery in the Companion to the Almanac for 1851, from which we extract some particulars. In 1525 Orontius Fineus extracted the approximate square root of 10 by adding ciphers, and obtained the decimal continuation 162. Instead of leaving the decimal fraction he preferred to present the result in the sexagesimal system then in use, converting his solution into 3·9′ 43″ 12‴. Another arithmetician of note, Tartaglia, objected to the procedure of Orontius on the ground that it showed more natural ingenuity than adherence to strict mathematical rule, and suspected that it would be found wanting in more difficult operations. Simon Stevin of Bruges, one of the accredited inventors of decimals, as already stated, wrote his decimals thus,

$$\begin{matrix}(0)&(1)&(2)&(3)\\27&8&4&7\end{matrix}$$

27 (0) 8 (1) 4 (2) 7 (3), and in operations 27 8 4 7 for 27·847. Here we have the Tamil and Chinese processes repeated. In the arithmetic of John Johnson (1623) the inclosing parentheses are disposed of, and

$$\begin{matrix}1&2&3\\\hline 27&847\end{matrix}$$

the decimals written 27|847, and sometimes the top figures are omitted, so that the modern practice is in reality arrived at though a line is used instead of a dot. Briggs, in 1624, adopted the practice of underlining the fractional portion of the number. In the second edition of Wingate's Arithmetic, published in 1650, our present mode of writing decimals was employed, and directions are given as to the insertion of ciphers. ('In decimalls when the numerator consists not of so many places as the denominator hath cyphers, fil up the void places of the numerator with cyphers.') Yet in 1651 so little was known of the matter that a treatise was published in London by Robert Jager, entitled Artificial Arithmetick in Decimals. Jager says that 'the common way of natural arithmetick being tedious and prolix, God in his mercy had directed him to that which he had published'. He wrote his decimals $6|\dot{7}\dot{2}\dot{4}$. See also Arithmetical Signs.

Among the many machines that have been invented for calculating numbers none are more celebrated than the one designed by the late Mr. Babbage, which, however, for various reasons, was never completed. It was to consist of two parts, a calculating and a printing part, both of which were necessary to the fulfilment of the inventor's views, for the whole advantage would be lost if the computations made by the machine were copied by human hands and transferred to types by the common process. The practical object of a calculating engine is to compute and print a great variety and extent of astronomical and navigation tables, which could not otherwise be done without enormous intellectual and manual labour, and which, even if executed by such labour, could not be calculated with the requisite accuracy. On the means of accomplishing this Mr. Babbage says, 'As the possibility of performing arithmetical calculations by machinery may appear to non-mathematical readers too large a postulate, and as it is connected with the subject of the division of labour, I shall here endeavour in a few lines to give some slight perception of the manner in which this can be done, and thus to remove a small portion of the veil which covers that apparent mystery. That nearly all tables of numbers which follow any law, however complicated, may be formed to a greater or less extent solely by the proper arrangement of the successive addition and subtraction of numbers befitting each table, is a general principle which can be demonstrated to those only who are well acquainted with mathematics; but the mind, even of the reader who is but very slightly acquainted with that science, will readily conceive that it is not impossible, by attending to the following example. Let us consider the subjoined table. This table is the beginning of one in very extensive use, which has been printed and reprinted very frequently in many countries, and is called a table of square numbers.

Terms of the Table.	A. Table of squares.	B. First Difference.	C. Second Difference.
1	1	3	2
2	4	5	2
3	9	7	2
4	16	9	2
5	25	11	2
6	36	13	
7	49		

Any number in the table, column A, may be obtained by multiplying the number which expresses the distance of that term from the commencement of the table by itself; thus 25 is the fifth term from the beginning of the table, and 5 multiplied by itself, or by 5, is equal to 25. Let us now subtract each term of this table from the next succeeding term, and place the result in another column (B), which may be called first-difference column. If we again subtract each term of this first-difference from the succeeding term, we find the result is always the number 2 (column C); and that the same number will always recur in that column, which may be called the second-difference, will appear to any person who takes the trouble to carry on the table a few terms further. Now, when once this is admitted as a known fact, it is quite clear that, provided the first term (1) of the table, the first term (3) of the first-differences, and the first term (2) of the second or constant difference are originally given, we can continue the table to any extent merely by simple addition: for the series of first-differences may be formed by repeatedly adding the constant difference 2 to (3) the first number in column B, and we then necessarily have the series of odd numbers, 3, 5, 7, &c.; and again, by successively adding each of these to the first number (1) of the table, we produce the square numbers.' Having thus thrown some light on the theoretical part of the question, Mr. Babbage proceeds to show that the mechanical execution of such an engine as would produce this series of numbers is not so far removed from that of ordinary machinery as might be conceived. He imagines three clocks to be placed on a table, side by side, each having only one hand, and a thousand divisions instead of twelve hours marked on the face, and every time the string is pulled each strikes on a bell the numbers of the divisions to which the hand points. Let it be supposed that two of the clocks, for the sake of distinction called B and C, have some mechanism by which the clock C advances the hand of the clock B one division for each stroke it makes on its own bell, and let the clock B by a similar contrivance advance the hand of the clock A one division for each stroke it makes on its own bell. Having set the hand of the clock A to the division I, that of B to III, and that of C to II, pull the string of clock A, which will strike one; pull that of clock B, which will strike three, and at the same time, in consequence of the mechanism we have referred to above, will advance the hand of A three divisions. Pull the string of C, which will strike two and advance the hand of B two divisions, or to division V. Let this operation be repeated; A will then strike four; B will strike five, and in so doing will advance the hand of A five divisions; and C will again strike two, at the same time advancing the hand of B two divisions. Again pull A, and it will strike nine; B will strike seven, and C two. If now those divisions struck or pointed at by the clock A be attended to and written down, it will be found that they produce a series of the squares of the natural numbers; and this will be the more evident if the operation be continued further than we have carried it. Such a series could of course be extended by this mechanism only so far as the three first figures; but this may be sufficient to give some idea of the construction, and was in fact, Mr. Babbage states, the point to which the first model of his calculating engine was directed. Babbage's great machine, after costing £17,000 to the government and a considerable sum to the inventor, was finally abandoned. The unfinished machine, called a difference engine, was placed by government in 1843 in King's College, London. He afterwards devised another machine, called an analytical engine, for higher mathematical calculations, but no funds were forthcoming for its construction. The first complete machine of the same nature as that designed by Mr. Babbage, a machine, that is to say, for calculating mathematical tables by the method of differences and printing the results, was constructed by two Swedish gentlemen, the Messrs. Scheutz (father and son). This machine was brought to London and exhibited there in 1854, and its success being conclusively demonstrated a similar machine was constructed for the British government on the recommendation of the registrar-general. At the present day a machine invented by M. Thomas of Colmar is the one most in use.

ARITHMETICAL MEAN is the number which lies equidistant between two other numbers. The arithmetical mean of a series is their sum divided by the number of the series.

ARITHMETICAL PROGRESSION. See PROGRESSION.

ARITHMETICAL SIGNS. The common signs used in arithmetic are the following: + signifying that the numbers between which it is placed are to be added; − that the second is to be subtracted from the first; × that the one is to be multiplied by the other; ÷ that the former is to be divided by the latter; division is also signified by writing the one number (the dividend) above, and the other (the divisor) below a horizontal line; = signifies that the one number is equal to the other; : : : : are the signs placed between the members of a proportional series, as 4 : 6 : : 8 : 12. A small figure placed on the right hand of another at the top signifies the corresponding power of the number beside which it is placed, as 5^2, 4^3, meaning the square of 5 and the cube of 4. $\surd$ placed over a number signifies the square root of that number; with a figure it signifies the root of a higher power, as $\sqrt[3]{}$, which means cube root. A period placed to the left of a series of figures indicates that they are decimal fractions.

ARIUS. See ARIANS.

ARIZONA, a territory of the United States, formed from that part of the old territory of New Mexico lying west of lat. 109° w., and bounded south by Mexico, west by Colorado River and California, and north by Utah and Nevada. The area is estimated at 113,020 square miles. The surface is generally mountainous, but many fertile and well-watered valleys lie between the ridges. The territory belongs to the basin of the Colorado which passes through a portion of it, while the Gila and Little Colorado, tributaries of the Colorado, traverse it from east to west. In some parts timber is plentiful. Irrigation has been successfully employed for agricultural purposes, and large tracts of elevated land have been found excellently adapted as pastures for sheep and cattle. The territory is rich in gold, silver, and

other minerals. Copper is found in abundance and is mined at three or four places, and amongst other metals obtained in smaller quantity are iron, lead, quicksilver, platinum, and nickel. Not much coal occurs in Arizona. Wheat is grown in many parts where irrigation has been introduced. Oats and various root-crops are also cultivated. In the centre of the territory, and in the Navajo reservation in the north-east, there are extensive pasture-lands. The territory owns about three-quarters of a million of cattle, nearly 600,000 sheep, besides many horses and other domestic animals. The manufactures are not of much importance. The temperature is generally agreeable in the north, but southern Arizona is one of the hottest parts of the United States. The rainfall is small over nearly the whole country, averaging less than 10 inches; and the summer is the wettest season. The capital is Prescott. The territory was organized with the usual government administration in Feb. 1863. The pop. in 1870 was 9658; in 1900, 122,212. There are about 6400 sq. miles of Indian reservations (Navajos, &c.), with an Indian population of 38,000.

ARK, the name applied in our translation of the Bible to the boat or floating edifice in which Noah resided during the flood or deluge, derived undoubtedly from the Latin *arca*, a chest or vessel. (See DELUGE.) In the synagogue of the Jews the chest in which the tables of the law were preserved bore the name of the *ark of the covenant*. This was a small chest or coffer, 3 feet 9 inches in length, 2 feet 3 inches in breadth, and the same in height, in which were contained the two tables of stone, and probably also the pot of manna and Aaron's rod. It was made of shittim-wood, and covered with the mercy-seat, called also the *propitiatory*, as the Septuagint expresses it, *hilastēriou epithēma*, that is, the lid or cover of propitiation, because, in the typical language of Scripture, those sins which are forgiven are said to be covered. This lid was made of pure gold; at either end was a cherub; these looked towards each other, and embraced the whole circumference of the mercy-seat with their expanded wings (Ex. xxv. 17, 22; xxxvii. 1–9); between which the Shekinah or symbol of the divine presence manifested itself in the appearance of a cloud, hovering, as it were, over the mercy-seat (Lev. xvi. 2). From hence the divine oracles were given (2 Ki. xix. 15; Ps. lxxx. 1). The high-priest once every year, on the great day of expiation, appeared before the mercy-seat to make atonement for the people (Heb. ix. 1–7). The ark was placed in the sanctuary of the temple of Solomon; before his time it was kept in the tabernacle, and was moved about as circumstances dictated. At the captivity it appears to have been either lost or destroyed, for the Jews universally concur in stating that among the things wanting in the second temple one was the ark of the covenant.

ARKANSAS, one of the United States of America, bounded north by Missouri; east by the Mississippi, which separates it from the states of Mississippi and Tennessee; south by Louisiana and Texas; west by the state of Oklahoma and Texas; area, 53,045 square miles; pop. in 1900, 1,311,564. The surface in the east is low, flat, and swampy, densely wooded, and subject to frequent inundations from the numerous streams which water it. Towards the centre it becomes more diversified, presenting many undulating slopes and hills of moderate elevation. In the west it rises into hills, being traversed by a range called the Ozark, which at some points attains a height of 2000 feet. In various parts the prairies are of great extent; the forests also are very magnificent, containing fine specimens, principally of oak, hickory, ash, black walnut, linden, maple, cypress, and pine. The principal rivers, all tributaries of the Mississippi, are the Arkansas, the Red River, the St. Francis, and the Washita. Near the centre and in the north-west of the state are warm springs, much resorted to for chronic rheumatic and paralytic affections. Their temperature varies, but in the driest seasons reaches the boiling-point. The climate, though on the whole mild, is subject to great extremes of heat and cold, and in the lower districts is unhealthy to new settlers. The soil differs much according to locality. Near the banks of the rivers it is usually fertile, but in not a few places it becomes almost sterile. The staple products are cotton and maize; fruit is tolerably abundant. Many districts are admirably adapted for grazing, and great numbers of excellent cattle are reared. Among wild animals may be mentioned the deer, otter, beaver, racoon, wild geese, wild turkeys, quails, &c. The minerals include iron, coal, salt, lead, and silver. The manufactures are unimportant. Arkansas, originally occupied by Indian tribes, chiefly the Osages, Cherokees, Choctaws, and Comanches, was colonized as early as 1685 by the French under Chevalier de Tonti. As part of Louisiana it was purchased by the United States in 1803. It was erected into a separate territory in 1819, and admitted into the Union in 1836. It was the scene of several campaigns during the civil war. All bodies, legislative and executive, are appointed by popular election, the governor and senators for four and the representatives for two years. Education has of late years been making rapid progress. The capital is Little Rock.

ARKANSAS, a river of the United States, which gives its name to the state of Arkansas. It rises in the Rocky Mountains, not far from the sources of the Rio del Norte, about lat. 39° N., lon. 107° W., flows in a general south-easterly direction through Colorado, Kansas, the Indian Territory, and lastly through the state of Arkansas, and after a course of 2170 miles enters the Mississippi on the right. Steamboats navigate it for 800 miles above its mouth during nine months of the year, and boats are able at some seasons to navigate it uninterruptedly for 1980 miles. Its principal tributaries are the Neosho and the Canadian. Both in its upper basin and along many parts of its banks are *salt prairies*, consisting of plains of reddish sand resting on thick beds of rock-salt. In dry hot weather the surface of these plains becomes incrusted with a layer of pure, white, crystallized salt, several inches deep.

ARKLOW, a town in Ireland, in the county of Wicklow, and 14 miles S.S.W. of the town of that name, on the right bank of the Avoca, which falls into the sea about 500 yards below the town, and is here crossed by a bridge of nineteen arches. It is divided into the upper and lower town. The houses of the former are neatly built. The Episcopalian church, a handsome edifice, is in the centre of the town, which also possesses several other churches. The lower town, built mostly of thatched mud cabins, is inhabited principally by fishermen. There are remains of an old monastery, and of the castle of the Ormonds, the latter destroyed by Cromwell in 1649. Here in 1798 the United Irishmen suffered a defeat. Pop. in 1901, 4944.

ARKONA. See ARCONA.

ARKWRIGHT, SIR RICHARD, famous for his inventions in cotton-spinning, was born at Preston, Lancashire, on Dec. 23rd, 1732, of parents in humble circumstances. He was the youngest of thirteen children, received but a very indifferent education, and was bred to the trade of a barber. In 1760 he became an itinerant hair-merchant, and increased his profits by the discovery of a valuable process for dyeing hair. His residence in a cotton-spinning

district (Bolton) naturally drew his attention to the operations of that manufacture; but he was thirty-five years of age before he gave himself up exclusively to the consideration of the subject. The *spinning-jenny*, invented in 1767 by Hargreaves, gave the means of spinning twenty or thirty threads at once with no more labour than had previously been required to spin a single thread. The thread spun by the jenny could not, however, be used as warp, being destitute of the firmness required. Arkwright supplied this deficiency by the invention of the *spinning-frame*, which spins a vast number of threads of any degree of fineness and hardness, leaving the operator merely to feed the machine with cotton, and to join the threads when they happen to break. His invention introduced the system of spinning by rollers, the carding, or *roving* as it is technically termed (that is, the soft loose strip of cotton), passing through one pair of rollers, and being received by a second pair, which are made to revolve with three, four, or five times the velocity of the first pair. By this contrivance the roving is drawn out into a thread of the desired degree of tenuity, a twist being given to it by the adaptation of the spindle and fly of the old flax-wheel to the machinery. (See COTTON-SPINNING.) The precise date of his invention is not known; but it is most probable that the idea of spinning by rollers had occurred to his mind as early as the period when Hargreaves was engaged in the invention of the jenny. His inventions being at length brought into a pretty advanced state, Arkwright removed to Nottingham in 1768, in order to avoid the attacks of the lawless rabble who thought his machines would deprive many workmen of a livelihood. Here his operations were at first greatly fettered by a want of capital; but two gentlemen of means having entered into partnership with him, Arkwright erected his first mill, which was driven by horses, at Nottingham, and took out a patent for spinning by rollers, in 1769. As horse-power was found too expensive he built a second factory on a much larger scale at Cromford, in Derbyshire, in 1771, the machinery being turned by a water-wheel. Having made several additional discoveries and improvements, he took out a fresh patent for the whole in 1775, and thus completed a series of the most ingenious and complicated machinery. When the importance of his inventions became known efforts were made to have the patent set aside, and so deprive Arkwright of the profit to be derived from them. In 1781 he commenced actions against a number of persons for invading his patent. Only one cause was tried, that against Colonel Mordaunt in the Court of King's Bench in July, 1781; and in that the verdict went against Arkwright on the ground of defective specification. In February, 1785, a second action was tried in the Court of Common Pleas, in which Arkwright brought a number of persons to prove that they could make machines from his specifications, in consequence of which he obtained a verdict in his favour. This producing great alarm among many who had erected machines for cotton-spinning, and from whom a royalty was demanded, in order to settle the dispute a suit was brought against Arkwright in the Court of King's Bench, in which the whole question was argued, not only as to the intelligibility of his specification, but on the less technical and more important ground of his not being himself the inventor of the machines for which he had obtained a patent. After a long and ably-conducted trial a verdict was given against Arkwright, and in November, 1785, the patent was cancelled. A new trial was applied for, but refused. None of Arkwright's most intimate friends, or those who were best acquainted with his character, ever had the slightest doubt with respect to the originality of his invention. In 1786 Arkwright received the honour of knighthood from George III., on the occasion of his presenting, as high-sheriff of Derbyshire, a congratulatory address to his majesty on his escape from the attempt on his life by the lunatic Margaret Nicholson. He died of a complication of ailments on Aug. 3rd, 1792. Unlike many inventors, Arkwright amassed a large fortune by his inventions.

ARLBERG TUNNEL. See TUNNEL.

ARLES (ancient, *Arelate*), a town and river port of France, department of Bouches du Rhône, on the Rhone, about 25 miles from its mouth. It stands on a rocky limestone eminence, sloping to the river, and has irregular streets, presenting many interesting features. In a large square is an ancient monolith of granite, said to be the only one executed out of Egypt. Among other remarkable objects are the ancient cathedral, with a fine portal and some good paintings and sculptures; the town-house; and especially numerous ancient remains, of which the most conspicuous are those of a Roman amphitheatre, which accommodated 24,000 spectators, and those of a Roman theatre. It has railway workshops, but its manufactures are unimportant, though its trade is important. Arles was founded several centuries before the Christian era and was the chief colony of Massilia (Marseilles). In the 4th and 5th centuries several church councils met here. From 879 to 1150 Arles was the capital of a kingdom bearing its name. Pop. (1891), 13,876; (1906), 17,336.

ARLON, a Belgian town, capital of the province of Luxembourg, and 15 miles W.N.W. of that town, in the midst of the woods and mountain ridges of the Ardennes. It is a thriving town, with manufactures of ironware, leather, tobacco, earthenware, and clay pipes. It is mentioned in the Antonine Itinerary, and from the coins, inscriptions, and other antiquities found, must have possessed some importance even in the time of the Romans. It is mentioned under its present name in 870, in connection with the partition of Lorraine. Arlon belonged to France from 1684 to 1697. On 19th April, 1793, and 15th April, 1794, Jourdan gained victories here over the Imperialists. Pop. (1890), 8029; (1900), 10,044.

ARM, in anatomy. The parts entering into the formation of the upper limbs in man are the following:—The scapula or shoulder-blade, the clavicle or collar-bone, the arm-bone (humerus), the two bones of the fore-arm (radius and ulna), the carpus or wrist, and the hand-bones. The same fundamental plan of structure exists in the limbs of all vertebrate animals —in the shoulder-fin of the fish, the wing of the bird, and the leg of the quadruped. See plates at article ANATOMY, also HAND.

ARMADA, the Spanish name for any armed force, especially a naval force. The term *Spanish Armada* is applied to that great naval armament which Philip II., in 1588, fitted out under the command of the Duke of Medina-Sidonia and Martinez de Recaldo, against Queen Elizabeth, with the view of conquering England, which Pope Sixtus V. had bestowed upon Spain. The fleet consisted of 130 great and 30 smaller ships of war, and carried 19,295 marines, 8460 sailors, 2088 slaves, and 2630 cannons, along with the Grand Inquisitor and 150 Dominicans. The ships had scarcely quitted Lisbon on May 29, 1588, when they were scattered by a storm and had to be refitted in Corunna. One ship went down, and three were carried by revolted galley-slaves into a French port. The armada now proceeded through the Channel to the coast of Flanders to free the ports of Nieuport and Dunkirk from the blockade of the

Dutch and English, with the view of transporting to England under convoy, in vessels constructed for the purpose, a land force of 31,000 foot and 4000 horse, collected at that point under the Duke of Parma. Advancing in the form of a half-moon of 7 miles in extent, it came in sight, off Plymouth, of the English fleet, scarcely numbering eighty sail, and commanded by Lord Howard, who, with his lieutenants Drake, Hawkins, and Frobisher, feeling himself too weak to venture on a regular engagement, endeavoured by dexterous seamanship, and the discharge of well-directed volleys of shot at alternately long and short distances, to damage the vessels of the enemy. Some of these, including the galleon laden with treasure, fell into the hands of the English or were destroyed. Arrived at length off Dunkirk, on the 7th of August, the armada was becalmed and thrown into such confusion by the arrival in the fleet of eight fire-ships sent by the English admiral, that on the morning of the 8th Lord Howard was enabled to attack it on several sides. Notwithstanding a brave resistance, many of the Spanish vessels were destroyed or fell into the hands of the English and Dutch, and in consequence the Duke of Medina-Sidonia resolved to abandon the enterprise. A strong south wind opposing his passage through the Channel, he conceived the idea of reconveying his fleet to Spain by a voyage round the north of Great Britain. Lord Howard pursued the enemy, but to provide himself with stores had to run into an English port, and thus narrowly escaped a hurricane which now broke forth with tremendous violence on the already dispirited Spaniards, scattering their ships in all directions. Some went down on the cliffs of Norway, others in the open sea, others on the Scottish coast. About thirty vessels reached the Atlantic Ocean, and of these several were driven by a west wind on the coast of Ireland and wrecked. In all, the armada is said to have lost in the open sea seventy two large vessels, exclusive of smaller craft, and 10,185 men, while every family of distinction in Spain had to mourn the loss of one or more of its members. To commemorate the destruction of the armada Elizabeth caused medals to be struck with the motto—'Afflavit Deus et dissipantur.'

ARMADILLO (*Dasypus*), a genus of Mammalia, belonging to the order Edentata, inhabiting the hotter regions of the American continent. The species comprised within this genus are provided with a hard armour-covering, consisting of scales or plates, arranged somewhat like a tesselated pavement or coat of mail, covering the upper surface of head, body, and in some species the tail. This shell forms a sort of shield on the head; a second, very convex, protects the shoulders; and a third is extended over the rump; while the space intermediate to the two last is occupied by a number of parallel plates, united by a strong flexible membrane, which allows of the necessary flexions of the body. Between the scales, or on those parts of the body not covered by the shell, there are a few scattered hairs. The development of the armour varies greatly in different species of these animals. All the armadillos have a rather pointed snout, long ears, and stout claws; of the latter some species have four on the anterior feet, others five; all, however, have five on the posterior feet. They have no incisors or canine teeth, but possess separate cylindrical molars, which are only enamelled on the outside, and which in the *Dasypus gigas*, or Great Armadillo, may number about 100. They feed on vegetables, insects, and carrion, have a simple stomach, and no cœcum. But for their peculiar fecundity the armadillos would be speedily exterminated, as they are sought with great avidity in Guiana, Paraguay, Brazil, &c., on account of their flesh, which is regarded as a great luxury. To obtain these animals is not so easy as might be supposed, since they burrow with astonishing rapidity, so that it is almost impossible to get at them by digging. The hunters are obliged to smoke them out of their holes. When they appear on the surface they are easily captured, as they roll themselves into a ball, and remain motionless as soon as approached by a dog or man. If near a precipice, however, they sometimes elude pursuit by thus rolling themselves up and falling from the top—a proceeding which apparently does not entail any injury. The Indians make use of the shell or covering of these animals, especially of the larger species, in the fabrication of baskets, &c. Like all the animals belonging to this order, the armadillos are slow-motioned and harmless; sometimes they are troublesome in gardens, both from the destruction of plants and the number and extent of the excavations which they form. The species are distinguished from each other principally by the number of bands on the trunk of the body, between the shield on the fore-shoulders and that on the rump. The best-known species of these animals are the Great Armadillo just mentioned, the Peba (*D. Peba*), the Poyou (*D. sexcinctus*), and the Tatouay (*D. Tatouay*). *D. novemcinctus* is shown in plate inserted at article CETACEA. The allied genus *Chlamyphorus* includes the *C. truncatus*, which attains a total length of only six inches. The *Glyptodon* (which see) was a gigantic extinct armadillo, the remains of which occur in rocks of tertiary age in South America.

ARMAGH, a county of Ireland, in the province of Ulster; bounded on the south-west by Monaghan, on the west by Tyrone, on the north by Lough Neagh, on the east by Down, and on the south-east by Lowth. The vicinity of the city of Armagh, in the north-west of the county, is rendered beautiful and picturesque by a gentle undulation of hill and dale, and in this quarter the soil principally consists of a rich loam, interspersed with limestone and limestone gravel. The northern part of the county, bordering on Lough Neagh, consists principally of extensive bogs of great depth, with a remarkably black soil. On the southern limits extends a range of barren mountains, the highest peak of which, Slieve Gullion, rises 1893 feet above sea-level. The chief crops are oats, potatoes, flax, and turnips. Oats occupy the largest area of any of the crops, potatoes coming next. Only a small quantity of wheat is grown. The rivers of most note in this county are the Blackwater, which separates it from Tyrone; the Upper Bann, which discharges itself into Lough Neagh; and the Callan, which falls into the Blackwater. There are several lakes, all of limited area; and also numerous streams of a minor description, and this abundance of water is extremely beneficial to various branches of industry, by the facilities it affords to mills and bleaching-grounds. The manufacture of linen is carried on very extensively. The chief towns are Armagh, Lurgan, Portadown, and Bessbrook. In the vicinity of Tynan is a lead-mine, the only mineral production of much importance yet discovered. The county has three parliamentary divisions, each with one member. Armagh is the county town. Pop. in 1871, 179,260; in 1901, 125,238.

ARMAGH, a city and formerly a parl. borough, capital of the above county, situated on two hills and the intervening valley, about half a mile from the Callan, a tributary of the Blackwater. The summit of one hill is crowned by the cathedral, a Gothic building erected about the eighth century, and repaired and beautified recently. On an eminence north of the town stands the new Roman Catholic cathedral, in the pointed Gothic style. The streets

are regularly laid out and well built. Among the public buildings are the county court-house, prison, infirmary, lunatic asylum, linen hall, music hall, &c. There is here a seminary of reputation—the royal school; also a public library and an observatory. In the middle ages Armagh was an extensive and populous city, and celebrated for its learning, having at one period, according to Irish historians, 7000 students at its college. It is the see of an archbishop of the Protestant Episcopal Church, who is primate of all Ireland. It ceased to be a parl. bor. in 1885. Pop. in 1881, 10,070; in 1891, 8303; in 1901, 7588.

ARMAGNAC, Counts of, an ancient French family, said to have sprung from a branch of the Merovingians. Many of its members hold a prominent place in the history of France. One of the most celebrated was Bernard VII., son of John II., surnamed the Hunchback. He succeeded his brother, John III., in 1391, and greatly extended his territories by the most unscrupulous means, putting several of his relations to death because they stood in the way of his ambitious schemes. Having been called to court by Isabella of Bavaria, with the view of heading the Orleans in opposition to the Burgundian faction, he had no sooner gained the ascendency than he compelled the queen to appoint him Constable of France, with the supreme command of its armies and fortresses, and the uncontrolled administration of its revenues. He now showed himself a merciless tyrant, and became so generally execrated that the Duke of Burgundy, to whom Isabella had turned for help, found little difficulty in gaining admission into Paris, and even seizing the person of Armagnac, who was cast into prison in 1418, and was negotiating his ransom when the exasperated populace burst in and massacred him. Another of the family, John V., grandson of the above, who succeeded his father, John IV., in 1450, made himself notorious for his crimes. On a pretended dispensation from the pope he married his own sister, by incestuous intercourse with whom he had three children. On the accession of Louis XI., of whom he was a partisan, he obtained an amnesty for his crimes, but he subsequently joined the league of the Bien Public. Louis XI. at last sent the Cardinal d'Albi to besiege him in his castle of Lectoure. Negotiations were entered into, and Armagnac and the cardinal pledged their faith by breaking and sharing a consecrated wafer. Armagnac, apparently not aware that he had met his match in craft, became remiss; and the cardinal, seizing his opportunity, gained possession of the castle, and murdered him (1473) in presence of his wife, Jeanne de la Foix, whom he had married in 1468.

ARMATOLIC (that is, 'territory of arms'), a district in the mountains of Greece assigned to a *capitani* for protection in the times before Greece became independent of Turkey. These armatolics were the last refuge of liberty in Greece in the time of the Turkish oppression. They were numerous in the mountains of Macedon, Epirus, and Thessaly; and the freedom of the Mainotes, Suliotes, inhabitants of Montenegro, &c., was supported almost entirely by them. When Mohammed II. finished the conquest of Greece, he was satisfied with possessing the plains, the fortified places, and the seaports. The natural fortresses of the country seemed unimportant to him, as well as to his successors, whose efforts were directed in preference against Hungary and Poland. To these fastnesses, unconquered by the Turks, fled the independent part of the Greeks, in order to continue the war in detail under their old leaders, called *capitanis*. A capitani collected generally a troop of from 50 to 200 men, who remained true to him through every variety of fortune, and attacked the enemy everywhere. Thus involved in an endless struggle with their oppressors, these Greeks were apt to degenerate and become little better than bandits. A large number of them were careful to confine their depredations to Mussulmans; but many instances occurred in which Greeks were attacked when the booty expected was considerable. The Turkish pashas, unable to subdue these enterprising warriors, generally treated with them; and the capitanis received, on condition of remaining quiet, money or stores, and the government of the district which was defended by their arms.

ARMATURE, a term applied to the piece of soft iron which is placed across the poles of permanent or electro-magnets, for the purpose of receiving and concentrating the attractive force. In the case of permanent magnets it is also important for preserving their magnetism when not in use, and hence it is sometimes termed the *keeper*. It produces this effect in virtue of the well-known law of induction, by which the armature, when placed near or across the poles of the magnet, is itself converted into a temporary magnet with reversed poles, and these, reacting upon the permanent magnet, keep its particles in a state of constant magnetic tension, or, in other words, in that constrained position which is supposed to constitute magnetism. A horse-shoe magnet should therefore never be laid aside without its armature; and in the case of straight bar-magnets, two should be placed parallel to each other, with their poles reversed, and a keeper or armature across them at both ends. The term armature is also applied to the core and coil of the electro-magnet, which revolves before the poles of the permanent magnet in the magneto-electric machine.

ARMED SHIP, a name used in Britain to signify a vessel occasionally taken into the service of the government in time of war, and employed to guard some particular coast, or to attend on a fleet. She is therefore armed and equipped in all respects like a ship of war, and commanded by an officer of the navy. By special arrangements some of the finest merchant vessels may now be utilized in time of war as auxiliaries of the navy.

ARMENIA, a mountainous country of Western Asia, not now politically existing, but of great historical interest. It varied in extent at different epochs, but it may be regarded as lying between lat. 36° 50′ and 41° 41′ N., and lon. 36° 20′ and 48° 40′ E. It was sometimes subdivided into First, Second, and Third Armenia, to which a Fourth was afterwards added; but the division by which it was almost universally known was into Armenia Major and Armenia Minor, or the Greater and the Less Armenia. It would seem to have stretched from the Caspian Sea and the Persian province of Azerbijan on the east to Asia Minor on the west, and from the river Kur or Cyrus on the north to Kurdistan and Mesopotamia on the south. Armenia Major comprised the larger and eastern portion of this area, extending westwards as far as the Euphrates and the Anti-Taurus, and having an area of about 84,000 square miles. Armenia Minor extended from the Euphrates to Asia Minor, and its area may be stated at about 53,000 square miles. The Euphrates thus intersects Armenia almost centrally, and forms the natural boundary between the two divisions now described. The territory of this once celebrated kingdom is now partitioned among Turkey, Persia, and Russia, Turkey possessing the largest share.

The plateau of which Armenia chiefly consists is mountainous and volcanic. The ridges, of which there are four principal, are generally parallel to each other, running, with sundry deviations, east and west, and between them are broad valleys and plateaux; that of the Aras, at Mount Ararat, being

2890 feet, and many others 5000 to 8000 feet above the sea-level. The mountains are mainly composed of trachytic porphyry; with slate, limestone, &c., appearing on the sides of the chains, and sometimes rising up with the porphyry. Granite is also met with, but is not frequent; and in the north tertiary fossiliferous rocks are found. Its volcanoes are all quiescent, unless we except Ararat, of which an eruption took place in 1840, accompanied by a disastrous earthquake. A few mountains, as Ararat, Alaghez, and Bangöl-dagh, rise above the line of perpetual snow, but this is not generally the case; and there are no passes but such as can be crossed in a single day. Silver, lead, iron, and copper are found in the mountains; and the last two have to some extent been wrought in modern times. Rock-salt is plentiful, and is exported in considerable quantities to Persia and elsewhere. Mineral waters abound, but little or nothing is known of their qualities.

Several important rivers take their rise in Armenia, namely, the Kur or Cyrus, and its tributary the Aras or Araxes, flowing east to the Caspian Sea; the Akampsis or Tchorak, and the Halys or Kizil-Irmak, flowing north to the Black Sea; and the Tigris and Euphrates, which flow into the Persian Gulf. There are also several minor tributary streams. The only considerable lakes are those of Van, 70 miles in length and about 28 in breadth; Goukcha, Sevanga or Sevan, north-east of Erivan, about 40 miles long by 15 broad; and Urumiyah.

The climate of Armenia is very severe, presenting quite a contrast to that of the warm regions of the Lower Euphrates, and to the mildness prevalent on the shores of the Black Sea. Any one, indeed, leaving the shores of the Pontus in April, and travelling rapidly south, may in one week experience the delights and discomforts of three seasons of the year. On the shore of the Black Sea he leaves spring in her most beauteous garb; on the plateau of Erzeroom he meets stiff, cold winter, and sees before him a wide extent of country covered with snow and ice; in Mesopotamia he finds approaching harvest, and the farmer busy with artificial irrigation to counteract the effects of the burning heat. Winter in Armenia continues from October to May, spring and harvest a month each, and the change to summer is very rapid. The heat, especially in the valleys, during summer, is great, and rain seldom falls. In Erivan, which is a degree of lat. south from Trebizond, the thermometer in winter falls 36° Fahr. lower than it does in the latter; and in summer it rises 24° Fahr. higher. On the plateaux of Erzeroom, Gumri, &c., the difference is still greater; indeed, in the town of Erzeroom the snow lies in the streets for eight months of the year. East and south-east winds in summer, west winds in spring, and north-east storm winds in winter, are most prevalent. Though severe, the climate, is, however, esteemed healthy. The soil of Armenia is reckoned on the whole productive, though in many places it would be quite barren were it not for the great care taken to irrigate it; to such an extent indeed is the system of irrigation carried on, that in summer many considerable streams are wholly absorbed. Wheat, barley, tobacco, hemp, grapes, and cotton are raised; and in some of the valleys apricots, peaches, mulberries, and walnuts are grown. From the nature of the country the rearing of stock is carried on to a greater extent than agriculture. The horses are spirited, fleet, and fiery. Pines, birches, poplars, and beeches flourish, but there are no thick forests except in the north parts of the country. The flora is not so varied as might be expected in such an Alpine country; in several respects it resembles the vegetation of the Alps of Tyrol and Switzerland.

The inhabitants are chiefly of the genuine Armenian stock; but besides them, in consequence of the repeated subjugation of the country, various other races have obtained a footing. Of these the principal are the Turcomans, who still maintain their nomadic habits, and from whom the country has received the name of Turcomania. In the south portion are the predatory Kurds and the Turks; on the Tchorak, Georgians; and throughout the whole country, Greeks, Jews, and Gipsies. The total number of Armenians has been estimated at 2,000,000, of whom probably one-half are in Armenia. The remainder, like the Jews, are scattered over various countries, and being strongly addicted to commerce, play an important part as merchants. They are found over all Western Asia; about 200,000 are in Constantinople and its vicinity; numbers are in Russia, Hungary, and Italy; some in Africa and America; and a large number in India, chiefly in the great marts, Bombay, Madras, and Calcutta. Everywhere they are engaged in banking and trading. Their eyes and hair are black, their look lively, noses aquiline, and their complexion somewhat swarthy. The women are remarkable for the delicacy and regularity of their features. Like the Jews, whom in many respects they resemble, their ruling passion appears to be an inordinate love of gain, but they are generally esteemed honest. Their mental capacity is good, and those who are educated are distinguished by superior cultivation and refined manners; but the mass of the people inhabiting their native country, in consequence of centuries of neglect, are grossly ignorant and superstitious.

History.—The legendary history of Armenia begins with Haïk, son of Togarmah, the great-grandson of Noah, mentioned in Gen. x. 3. He is said to have taken refuge in Armenia from the tyranny of Belus, king of Babylon, who was slain in pursuit of him. The seventh king in descent from Haïk was killed in battle with Semiramis, and the country became tributary to Assyria. From Haïk the country derived the name Haikistan, and from Aram, his sixth successor, that of Armenia. Armenia continued subject to Assyria under its own princes till the revolt of the Medes and Babylonians against Sardanapalus, when Barbak, the king of Armenia, joined these powers and recovered his independence. Tigranes I. is said to have been the ally of Cyrus against Astyages, and to have built the city of Tigranocerta. His successor, Vhakin, the legendary hero of Armenia, was deified after his death. Vahi, the last of the dynasty of Haïk, was killed in fighting against Alexander as the ally or vassal of Darius. The duration of the dynasty was about 1800 years. Armenia was now incorporated with the Kingdom of Syria. It recovered its independence under Ardvates (B.C. 317), during the dissension amongst the successors of Alexander, but on his death submitted to the Seleucidæ. About B.C. 190 Artaxias and Zariadres, two Armenian nobles, freed themselves from the dominion of Antiochus the Great and established the Kingdoms of Armenia, Major and Armenia Minor. Armenia Major was reconquered from Artaxias II. by Antiochus Epiphanes. About 149 B.C. Mithridates, or Arsaces VI., king of Parthia, whose dominion extended over Media, Persia, and Babylonia, placed his brother Waghershag or Valarsaces on the throne of Armenia, and introduced the dynasty of the Arsacidæ into the country. He built cities and organized the defences of the country. His great-grandson Tigranes II., whose long reign appears to have begun about B.C. 96, conquered Artenes, king of Sophene or Armenia Minor, and united all Armenia under his sway. He was successful in war against the Parthians, and made himself master of the whole Syrian monarchy. He

is also said to have founded or built Tigranocerta, the origin of which is likewise attributed to his probably mythical predecessor. Being the son-in-law of Mithridates, king of Pontus, while Mithridates was preparing to renew his war with the Romans after the death of Sulla he invaded Cappadocia at his instigation and carried away much spoil and many prisoners. Mithridates, after his defeat, took refuge with Tigranes, who does not seem to have been disposed to render him active assistance; but Lucullus made a peremptory demand through Appius Clodius for his surrender, which left Tigranes no alternative but a declaration of war (B.C. 69). Disregarding an invasion of Cilicia, Lucullus at once carried the war into Armenia, defeated the numerous forces of Tigranes, and captured Tigranocerta. Antiochus Eusebes was reinstated on the throne of Syria, and other dependants of Tigranes revolted. Tigranes in the meantime, with the assistance of Mithridates, collected another army, which was again defeated by Lucullus (B.C. 68). Favoured by disaffection among the Roman troops, however, Tigranes recovered the greater part of Armenia, and defeated Fannius, the lieutenant of Lucullus. Pompey, who arrived in B.C. 66, after overthrowing Mithridates, who had also recovered his dominions, advanced to Armenia, which was at the same time invaded by the Parthians, instigated by the revolted son of Tigranes. The Parthians speedily withdrew, and young Tigranes fled to Pompey. At this critical juncture the elder Tigranes hastened to make his submission to the Roman general, who left him in possession of his kingdom, but deprived him of the provinces of Sophene and Gordyene, which he erected into a kingdom for the younger Tigranes. The elder Tigranes continued faithful to the Roman alliance, and Gordyene, which had been seized by the Parthians, was soon after restored to him. Tigranes died about B.C. 55. His son Artavasdes was made prisoner by Antony in B.C. 34 and carried to Egypt, where he was put to death by Cleopatra in B.C. 30. Armenia continued subject to the Romans, who appointed its princes from the family of the Arsacidæ till the time of Trajan, who made it a province. It was given up by Hadrian and again ruled by the Arsacidæ. Chosroes defended it during a long reign against the power of Persia, which had recently re-established its monarchy on the ruins of the Parthian Empire; but about A.D. 258–259 Sapor, king of Persia, unable to subdue Chosroes by force of arms, caused him to be assassinated, and his son Tigranes being an infant, took possession of the country. Tigranes was restored by the Romans in 286, the third year of Diocletian. At the beginning of his reign he persecuted the Christians, who were numerous in Armenia, but was himself converted to Christianity, it is said, by Gregory the Illuminator. Armenia was thus the first country which officially embraced Christianity. On the defeat of Galerius by the Persians in 296 Tiridates, who fought valiantly as the ally of the Romans, was compelled to follow the retreat of his protectors; but the succeeding campaign restored him, and his dominions were extended in the peace with Persia which followed. By the treaty into which Jovian, the successor of Julius, entered with Sapor II. (A.D. 363), the Romans were compelled to abandon the protection of Armenia. It was speedily reduced to a Persian province, but after the death of Sapor (380) its independence was restored in a new treaty of peace made with Theodosius in 384. The country, long oppressed by the contentions between the Romans and Persians, soon fell into division through the attraction of these rival powers. A Persian king or governor, Chosroes, was set up over the eastern, and a Roman, Arsaces, over the western portion of the country, both being of the royal house of Armenia. On the death of Arsaces the Romans suppressed the form of royalty, and annexed their portion of the country to the empire under the military command of a count of the Armenian frontier. This occurred in the reign of Theodosius II. On the death of Artasires or Ardashir, the successor of Chosroes, Bahram V. of Persia (about 431) annexed the Persian portion under the name of Persarmenia. The Persians exerted themselves to extirpate Christianity, but failed to do so; and on the fall of the Sassanidæ (632) the country was united again under the Greek Empire. It now became the scene of incessant struggles between the declining empire and the rising Mohammedan power, and as it was persecuted by the emperors for its adoption of the Monophysite heresy its sympathies were not always with the former. The dynasty of the Pagratids or Bagratidæ was established by the arms and influence of the Caliphs. It was a family of Jewish origin, and appears to have risen gradually to influence in the country. The date of its elevation to royalty is usually given as 885, but a much earlier date is sometimes assigned. It lasted till 1079, when the country again became dependent on the Greek Empire. During this period several other dynasties which it is not necessary specifically to notice reigned simultaneously in different parts of the country. On the fall of the Pagratidæ a relative of the last king founded a small kingdom in the north of Cilicia, which gradually extended to the Mediterranean, and was known as Lesser Armenia. It was overthrown by the Mamelukes in 1375. Armenia formed part of the empires of Genghis-Khan and Tamerlane, and a great part of it was conquered by Selim II. in 1522. Henceforth it was shared between the Turks and Persians, the former having the greater part of it. In 1828 Russia obtained a considerable portion of it, and this was greatly augmented by the treaty of Berlin (1878). Russian Armenia includes the governments of Erivan and Elizabethpol, the territory of Kars, &c., with the important towns of Tiflis, Kars, and Erivan. At the time of the Berlin treaty Turkey made promises of better treatment for her Armenian subjects, but these have been disregarded and recently (1895–96) many thousands of the Armenians in different localities have been massacred and atrocious cruelties perpetrated upon them by the Turks, with full approval, it would seem, of the Sultan and his advisers.

Armenian Church.—The Armenians received Christianity as early as the third century. During the Monophysitic disputes, being dissatisfied with the decisions of the Council of Chalcedon (451), they separated from the Greek Church in the year 536. The popes have at different times attempted to gain them over to the Roman Catholic faith, but have not been able to unite them permanently and generally with the Roman Church. There are, however, small numbers here and there of United Armenians, who acknowledge the spiritual supremacy of the pope, agree in their doctrines with the Catholics, but retain their peculiar ceremonies and discipline. At different times force has been used to make them conform to the religion of Mohammed; but the far greater part are yet Monophysites, and have remained faithful to their old religion and worship. Their doctrine differs from the orthodox chiefly in their admitting only one nature in Christ, and believing the Holy Spirit to issue from the Father alone. In their seven sacraments, which they call mysteries, there are these peculiarities, that in baptism they sprinkle thrice and dip thrice, and this is immediately followed by confirmation; that in the Lord's Supper they mix no water with the wine, and use leavened bread, which they distribute dipped in wine; and that they allow

extreme unction only to divines immediately after their death. They adore saints and their images, but do not believe in purgatory. In fasting they surpass the Greeks. Their feasts are fewer than those of the Greeks, but they celebrate them more devoutly. They worship, in Turkey, mostly in the night time; the mass is said in the ancient Armenian, the sermon is preached in the modern. Their hierarchy differs little from that of the Greeks. The *catholicus* or head of the church has his seat at Etchmiadzin, a monastery near Erivan, the capital of the Russian Armenia, on Mount Ararat. The holy oil, which he prepares and sells to the clergy, and the frequent pilgrimages of the Armenians to Etchmiadzin, supply him with means for the support of a magnificent style of worship and of establishments for education. He maintains in his residence a seminary for the education of divines. There is here also a printing-press. The patriarchs, bishops, and archbishops of the Armenians are invested by him, and every three years confirmed in their offices or recalled. The remainder of the clergy resemble the priests of the orthodox church in rank and duties. The monks follow the rule of St. Basil. The *vartabets*, who live like monks, cultivate the sciences, take degrees, which may be compared with our academical honours, and are the vicars of the bishops, form a class of divines peculiar to the Armenian Church. The secular priests must be married once, but are not allowed to take a second wife. Both monks and clergy in general are ignorant and superstitious.

Language and Literature.—The Armenian language belongs to the great Indo-European family of languages, and is most closely connected with the Iranic group. The Old Armenian or Haikan language, which is still the literary and ecclesiastical language, is distinguished from the New Armenian, the ordinary spoken language, which contains a large intermixture of Persian and Turkish elements. The most learned Armenian antiquaries do not pretend to trace their literature further back than about 150 years before the Christian era, when Marabas Catina wrote a history of Armenia, and earned for himself the title of the Armenian Herodotus. He was followed by some half-dozen historians and mythologists, but all these early productions are lost, though they have not been quite valueless, inasmuch as they were the sources whence later Armenian writers compiled works still extant. The authors who lived in the fourth century of the Christian era are the first whose writings have been preserved. Christianity then prevailed in Armenia, and her authors were princes and prelates. The fifth century was the golden age of Haikan literature. This century was fruitful in authors, and was further distinguished by two events important to the progress of learning. The Armenians had till then had no alphabet of their own, indifferently using Greek, Syriac, and Persian characters. Early in the fifth century Mesrop Masdoty invented a Haikan alphabet of thirty-eight letters, still called, in honour of the inventor, Mesropian, and now employed as capitals, since others of more convenient form have supplanted them in common use. About the same time schools were instituted throughout Armenia, and the scholars there trained exerted themselves in producing Haikan versions of the Bible, and of the master-pieces of Greece and Rome. One of the most distinguished authors who now appeared was Archbishop Moses Chorenensis or Chorenabyi. Besides innumerable translations, he wrote a history of Armenia, a treatise upon rhetoric, and a treatise upon geography—all of which, together with some homilies, have been preserved, as well as some hymns still habitually sung in the Armenian Church service. His History of Armenia was published in 1736, with a Latin translation, by the celebrated W. Whiston and his son George. In the sixth century Haikan literature first remained stationary, and then began to decline. This decline continued down to the sixteenth century. During this period authors abounded, but in a literary sense their productions were worthless. A few histories, however, national, Tatar, Arab, &c., some of them in verse, deserve esteem for the information they contain. In the seventeenth century Armenian schools and colleges arose in the East and in the West, Armenian printing-presses were set up in various towns, and Armenian literature began to revive. In the eighteenth century the revival was complete, very much owing to the zealous and judicious exertions of Petro Mechitar, a Catholic Armenian, who in 1701 founded a religious society at Constantinople for the purpose of elevating the Armenians by diffusing among them a knowledge of their ancient literature and language. Being persecuted by the opposite sect he fled with his adherents to the Morea, then under the Venetians, and established a monastery and academy at Modon. The Morea reverting to the Ottoman sceptre, Mechitar transferred his institution to the small island of San Lazaro at Venice, where it has ever since remained and prospered. Abbot Mechitar, during the remainder of his life (he died in 1749), successfully exerted himself to render his monastic college the chief seat of Armenian erudition and education. The best Armenian press extant is the Mechitarist, from which issues a newspaper that circulates widely in the Levant. Here many of the classical works of England, France, Italy, and Germany have been translated into Armenian. There is also a Mechitarist college in Vienna, and a branch in Munich. Wherever any extensive community of Armenians have settled they have set up a printing-press, as in Amsterdam, Leghorn, Moscow, Venice, Astrakhan, Constantinople, Smyrna, Tiflis, St. Petersburg, Madras, Calcutta, &c., and at several of these places periodicals are published. The best Armenian dictionaries for foreigners are the Armenian-French one published at Venice in 1812; the Armenian-Italian of Emmanuel Tchaktchak (Venice, 1837); the Armenian-English of Aucher as improved by Bedrossian (Venice, 1868–79; both Armenian-English and English-Armenian); the French-Armenian of Norayr (Constantinople, 1884); and the German-Armenian of Goilav (Vienna, 1889).

ARMENTIÈRES (Latin, *Armentaria*), a town in France, department of Nord, on the Belgian frontier, 10 miles W.N.W. of Lille, on the Lys, which has here a small harbour and an active navigation. The town, which is well built, has a communal college or high school, and factories for spinning flax, hemp, and cotton yarn. There are also manufactories of woollen cloth, table linen, calicoes, lace, thread, beetroot sugar, and tobacco; bleachfields, distilleries, soap-works, tanneries, and salt-refineries, with a considerable trade in grain, brandy, iron, tobacco, soap, &c. Bricks are made in the neighbourhood in large quantities. Pop. (1896), 26,714; (1906), 27,260.

ARMFELT, Gustav Moritz, Count of, a distinguished Swede, was born April 1, 1757, being the eldest son of Major-general Baron Armfelt. He was educated in the military school at Carlscrona, and was afterwards appointed ensign in the guard at Stockholm. By his fine figure and the charms of his conversation he gained the favour of Gustavus III. He was rapidly promoted, and loaded with marks of distinction. In the war against Russia (1788–90) he greatly distinguished himself, on which account he continued to rise in the favour of his king. As lieutenant-general he concluded the Peace of Werelæ, was honoured by the Russian empress with several orders, and received, even at the death-bed of his

sovereign, the most flattering marks of royal favour. He was appointed governor of Stockholm, and connected, by means of Gustavus III., in marriage with the ancient family of the Count de la Gardie. He was said also to have been intended for president of the council of regency during the minority of Gustavus IV., though the guardianship of the young king had been assigned to the Duke of Sudermania by a previous will. Possibly this is the source of the hatred with which Armfelt was now persecuted. He was deprived (Sept. 7, 1792) of his chief offices and dignities, and sent as ambassador to Naples. It was supposed, not without foundation, that an unrequited passion of the Duke of Sudermania for a court lady, Von Rudenskjold, by whom Armfelt was favoured, had exasperated his rivalry to hate. It is certain that Armfelt and Rudenskjold were made the subject of scandalous rumours; she was subjected to indignity in the house of correction; and he, then in Italy, escaped the daggers of hired assassins and a formal requisition of the Swedish government only by flight, was declared a traitor and an outlaw, and all his fortune and honours, nay, even his nobility, were pronounced forfeit. He afterwards resided in Germany till 1799, when Gustavus IV. annulled this decree, and restored Armfelt to his former situation. He was appointed ambassador to the court of Vienna, and in 1807 the rank of general of infantry was conferred on him. As such he commanded the Swedish troops in Pomerania, and in 1808 the western army against Norway. In the autumn of this year he was appointed president of the military institution at Stockholm, and made a peer of the kingdom. In 1810 he obtained his desired discharge, and lived as a private man at Stockholm. He afterwards entered the Russian service, was made count, chancellor of the University of Åbo, president of the department for the affairs of Finland, and member of the Russian senate; served in the campaign against Napoleon in 1812, and died August 19, 1814, at Tsarsko-selo.

ARMIDA, one of the principal female characters in Tasso's Jerusalem Delivered, the daughter of Arbilan, king of Damascus, who by her beauty and her magical arts brings confusion into the ranks of the knights of the cross, and in particular entices the hero Rinaldo, with whom she had fallen violently in love, to her enchanted gardens. In her arms and among her delightful gardens Rinaldo completely forgets the high task to which he had devoted himself, until messengers from the Christian host having arrived at the island by means of a powerful talisman, Rinaldo escapes with them. In despair Armida destroys all the magical creations of her island, and hastens to the Saracens to stir up the heroes to fight with Rinaldo. But all fall beneath his arm, and Armida herself meeting him in battle is also defeated. Rinaldo now assures her of his love, and on her receiving baptism declares himself her knight. Gluck and Rossini have each composed an opera on this subject.

ARMILLARY SPHERE, an arrangement of rings, all circles of one sphere, intended to show the relative positions of the principal circles of the heavens. The term 'armillary' is derived from the Latin *armilla*, signifying first a bracelet and then a hoop generally. These spheres are of two kinds, distinguished by the position which they assigned to the earth, and called respectively the sphere of Ptolemy and the sphere of Copernicus. The former, the invention of which is ascribed to various Greek philosophers, and even mythical heroes, places the earth in the centre of the solar system, and by means of its various circles and movements gives an accurate representation of its *apparent* motions; the latter places the sun in the centre, but though thus scientifically correct is of less practical value, and hence seldom used. The ancient astronomers Hipparchus and Ptolemy, and even the modern astronomer Tycho Brahe, made much use of the former instrument in their observations.

ARMINIANS, a religious sect which has its name from its founder, Arminius. In Germany and Holland they are more generally called *Remonstrants* on account of the title Remonstrantia which they gave to a document presented in 1610 to the States-general of Holland, in which they endeavoured to prove the opinions of the Reformed Church in respect to predestination erroneous. Diversity of opinion on this subject was the chief reason of their separation from the Reformed Church. In the document above mentioned they maintained:—1, That God had indeed resolved from eternity on the salvation and damnation of men, but with the condition that all those who believed should be saved, while the unbelievers should be damned; 2, that Christ died for all men, although nobody could partake in his salvation except he believe; 3, that nobody can have saving faith from himself, but must be born again of God, in Christ, through the Holy Ghost, in order to attain it; 4, that nobody can, without the grace of God, think, will, or do anything good, because all our good works have their origin in God's grace; 5, that the faithful can struggle against Satan, the flesh, and the world, and conquer them, by the assistance of the Holy Ghost. This is the genuine doctrine of Arminius and his sect. From these original Remonstrants, however, are to be distinguished those who were not satisfied with these five articles, but proceeded farther in the contest with the Reformed or Calvinistic Church. As even before the Arminian dispute several writings of Socinus had been circulated secretly in Holland, particularly among the men of learning, who were almost all Arminians, it was natural that the later Arminians should coincide in many points with the Socinians. In 1611 the opponents of the Arminian views promulgated a counter-remonstrance, from which they got the name of Counter-Remonstrants; but they are perhaps more frequently called Gomarists, from their leader, Francis Gomarus, professor of theology at Leyden. The opposition between the two parties was carried on with a good deal of bitterness, which two religious conferences held at the Hague in 1611 and Delft in 1613 did nothing to allay. In 1614 the States of Holland, on the advice of the pensionary of the council, Oldenbarneveldt, and the celebrated jurist Hugo Grotius, issued an ordinance directing the Remonstrants and Counter-Remonstrants to live in love and charity with each other. But it is not surprising that this ordinance was without effect. The Gomarists expressly protested against it, and demanded a general synod to settle the questions in dispute. The most powerful support of the Gomarists was the stadtholder, Maurice of Orange, who was aiming at the extension of his power; while the Arminians, more republican in their sentiments, stood on the side of his political opponents, Oldenbarneveldt and Grotius. In the provinces of Zeeland, Gelderland, Friesland, Groningen, and Oberijssel the proposal that a general synod should be called was carried, and in Utrecht, hitherto the stronghold of the Arminians, the constitution was arbitrarily altered to break the resistance. The overthrow of the Arminians was thus virtually decided before the synod met. This was the famous Synod of Dort (Dordrecht), which was held from November 13, 1618, to May 9, 1619, and was attended by deputies from foreign churches, among others, from England, by the celebrated Bishop Hall. It decided against the Arminians on

all the points in which they differed from the strict Calvinists, holding that, however hard the doctrine of absolute election might seem to be, it was clearly a doctrine of Scripture, and could not be rejected. The Arminian divines (above 200 in number) were deposed, and condemned to silence on pain of banishment from the land. The resolutions of the synod were confirmed by the States-general, and were enforced in the most unsparing manner. Even before the meeting of the synod on the 29th of August, 1618, Oldenbarneveldt had been arrested, along with Grotius, Ladenberg, and Hogerbeets. Oldenbarneveldt was condemned to death on the charge of disturbing the church of God by the promotion of heresy and some other charges, and was executed on the 13th of May, 1619 Ladenberg took away his own life. Grotius and Hogerbeets were sentenced to perpetual imprisonment. Grotius, however, escaped after two years' captivity, but Hogerbeets remained in confinement till the year of his death. But in spite of these acts of persecution the Arminians still increased, and in course of time the spirit of the dominant party became somewhat more tolerant, especially after Maurice was succeeded in the stadtholdership by his brother Henry (1625), when the banished Arminians were not only permitted to return but even to build places of worship for themselves. The first was built in Amsterdam in 1630. In Amsterdam they established a theological academy, which became very famous through the labours of such men as Episcopius, Limborch, and Wetstein. They did not endeavour to increase their sect. Any one who joined them was not obliged to accept their creed, but only to declare generally that he was a believer in Christianity according to the apostles' creed, and endeavoured to regulate his life according to Christ's commands. Their public service was almost entirely like that of the Calvinistic Church, only they did not require, like this church, from the parents of a child about to be baptized, a profession of belief in their doctrines, and a promise to educate the child in the same, but demanded only a promise to educate the child in the Christian faith without mentioning the creed of any sect. The Arminians were very numerous as long as they were persecuted, but rather decreased when they had gained liberty and peace. But the influence both of their special doctrinal tenets and their mild and tolerant spirit far exceeds what could naturally be expected from the numerical strength of the body. From the time of Laud their views have been predominant in the Church of England.

ARMINIUS (*Hermann* is a spurious modern German version of this name, the exact form of which is unknown), an ancient German hero celebrated by his fellow-countrymen as their deliverer from the Roman yoke. He was the son of a prince of the Cherusci, and was born about 18–16 B.C. He fought in the service of the Romans under Saturninus against Maroboduus, king of the Marcomanni, and in Pannonia, and was raised to the rank of Roman *eques*. Returning home he married Thusnelda, daughter of a neighbouring chief. At this time the Roman governor, Quintilius Varus, was making efforts to Romanize the German tribes near the Rhine, and Arminius placed himself at the head of the Cherusci, who were greatly exasperated at these proceedings, and determined to resist them. He also succeeded in gaining over the chiefs of several other tribes, and in A.D. 9 completely annihilated the army of Varus, consisting of three legions, in a three days' battle fought in the Teutoburg forest. The exact site of this battle has been much disputed. According to the data supplied by Tacitus it may be sought for either east of the sources of the Ems and Lippe, or further west between Stromberg, Beckum, and the Lippe; but names such as Feldrom, Römerfeld, Todtengrund, Winnefeld, Mordgrund, Lagerberg, Varenburg, Teuthof, Sieghof, Blutbach, &c., occurring in the former district to the south of Detmold, point to it as most probably containing within it the site of the battle. The Germans did not pursue their victory further. They were content with having secured their independence for the moment. Augustus, the Roman emperor at that time, felt this disaster very keenly, and died (14 A.D.) in the midst of preparations for a war of revenge. When Tiberius ascended the imperial throne, after the death of Augustus, Germanicus received the command of the army on the Rhine, and at the head of it endeavoured to recover the lost territory. Segestes, the father-in-law of Arminius, showed a disposition to favour the Romans, on which account he became involved in war with Arminius, who besieged him. He was, however, relieved by Germanicus, who took Thusnelda captive to Rome to adorn his triumph. Still further embittered against the Romans by this act, Arminius made greater efforts than ever to destroy them, but was unable to gain any successes against Germanicus in the field. One battle was indecisive, but in another Arminius was defeated (A.D. 16). Germanicus, however, was not in a position to follow up his victory, but immediately after withdrew his army into winter-quarters. Soon after Germanicus was recalled, and with his recall terminated the efforts of the Romans against the Germans in this quarter. Meanwhile Maroboduus had established his powerful kingdom of the Marcomanni, and war soon broke out between him and Arminius (17). The armies of the two chieftains met in modern Saxony, and an indecisive battle was fought. Maroboduus avoided a second battle by retreat. Arminius afterwards drew upon himself the hatred of his countrymen by aiming at the regal authority, and in 21 A.D. was assassinated by his relations. A national monument, after the designs of Ernst von Bandel, has been erected to him on the Grotenburg, near Detmold. It was begun in 1838, but various circumstances retarded its progress, so that it was not completed till 1875. On the 16th of August in that year it was solemnly inaugurated by the Emperor of Germany.

ARMINIUS, JACOBUS (properly JAKOB HERMANS), founder of the sect of Arminians or Remonstrants, was born at Oudewater, in South Holland, in 1560. He studied at Utrecht and in the University of Leyden. Here he obtained so much reputation that the magistrates of Amsterdam sent him, at the public expense, to finish his studies at Geneva, where his chief preceptor in theology was Theodore Beza (1582). Adopting, in philosophy, the new doctrines of Peter Ramus, he privately taught them, which innovation gave so much offence that he was obliged to quit Geneva. He withdrew for a time to Basel, where he delivered his lectures with great success, and afterwards returned to Geneva, where he managed to conciliate the professors who had shown hostility to him. Anxious to attend the celebrated lectures at Padua, he next visited Italy (1586). He returned to Holland in the following year, and in 1588 was appointed minister of one of the churches in Amsterdam. Distinguished by zeal for the reformed religion, and talents as a preacher, he was chosen to undertake the refutation of a work in which two preachers of Delft, Arnoldus Cornelii van der Linden and Reinier Donteklock, strongly controverted Beza's doctrine of predestination; but he happened to be convinced by the work which he had undertaken to refute. He honestly avowed his change of opinion, and renouncing the Calvinistic doctrine concerning the decrees

of God and divine grace, maintained that the merits of Christ extended to all mankind, and that the grace necessary to salvation is attainable by every one. Elected in 1603 professor of divinity at Leyden, as successor of Junius, he openly declared his opinions, which rapidly spread both among the clergy and laity. The adherents to the Calvinistic system, however, caused him much vexation. He was several times summoned to the Hague to give an account of his doctrines, and his colleague Gomarus was among the most violent of his enemies. These contests, with the continual attacks on his reputation, at length impaired his health and brought on a complicated disease, of which he died on the 19th of October, 1609. Arminius was candid, amiable, sincere, and possessed of great integrity. His ability too was great; but the system which now bears his name was elaborated after his death by Episcopius and Limborch, some of its peculiar tenets not having been held by Arminius. (See ARMINIANS.) He was a friend to universal toleration, maintaining that Christians are accountable to God alone for their religious sentiments. An edition of the whole writings of this divine was published in one volume (4to, Leyden), in 1629. Several other editions appeared later. The principal piece in this collection is entitled Dissertationes de Diversis Christianæ Religionis Capitibus.

ARMISTICE, a suspension of hostilities between two belligerent powers or two armies by mutual agreement. It may either be for a definite period or until its termination is proclaimed. An armistice throughout the whole theatre of war can be concluded only by the belligerent governments, and does not take full effect until it has been ratified. A partial armistice may, however, be concluded by the commanders of individual armies or army corps, and such an armistice requires no ratification, although it may be disapproved and abolished by the government. After the acceptance of an armistice the enemies come to an agreement as to the positions to be taken up by each during the time it lasts, and these positions are usually separated by a line of demarkation. An armistice is often concluded for only a few hours to bury the slain, remove the wounded, and exchange prisoners, as also sometimes to allow of a parley between the opposing generals. A breach of an armistice is regarded as a violation of the law of nations. There are, nevertheless, certain cases in which generals, especially commanders of fortresses, are not required to submit to an armistice, the terms of which may require them to surrender their fortresses or allow their troops to become prisoners of war. Sometimes a regular armistice is preceded by an actual suspension of hostilities, as happened in Bohemia in 1866. If the conditions on which an armistice was agreed upon, as that while it lasted all preparations for attack or defence should cease, are violated by either side, the enemy is entitled to resume hostilities at once. A general armistice is usually the preliminary of a peace.

ARMORICA, a geographical name formed from two Celtic words signifying 'upon the sea.' It was apparently applied in ancient times to the whole northern and western coast of Gaul, from the Pyrenees to the Rhine. It was afterwards confined to the province of Brittany.

ARMOUR, COAT OF, the escutcheon of any person or family, with its several charges and other furniture; as mantling, crest, supporters, motto, &c. Thus the phrase, 'a gentleman of coat-armour,' means one who bears arms. See HERALDRY.

ARMOURER, formerly a maker of arms and armour, a very important handicraftsman in the middle ages and down to the end of the sixte nth century and even later. (See ARMS AND ARMOUR.) At the present day the term is applied in the British army to persons employed to keep the arms of the soldiers in repair. There is one of these to every regiment of cavalry, every battalion of infantry, and every brigade of artillery. They bear the title of armourer-sergeants, and there is a school for training them at Enfield. On board a man-of-war the armourer is a petty officer appointed to keep the small arms in complete condition for service.

ARMOUR-PLATED VESSELS. See IRON-CLAD VESSELS and WAR-SHIP.

ARMOUR-PLATES. Some account of the dimensions of the armour-plates of ships of war and of the mode of fitting them will be found in the articles IRON-CLAD VESSELS and WAR-SHIP. These used all to be made of iron, but plates of solid steel, often hard-faced, are now chiefly employed, and more especially of steel with a small mixture of nickel and chromium. The plates have to be made of great thickness in order to resist the heavy steel projectiles fired from modern guns. In regard to such plates the question of hardness and brittleness is of great importance as well as that of penetrability; that is, a certain gun and projectile might not be able to penetrate a certain class of armour, but yet might fracture and destroy it by repeated shots.

ARMS, COAT OF. See ARMOUR (COAT OF).

ARMS AND ARMOUR. The earliest arms were everywhere made of stone. They are usually known by the name of *celts*, and are described in the article under that heading. As for other implements stone was succeeded by bronze as a material for the manufacture of weapons of war. The commonest warlike relics of the bronze age that have come down to us are daggers and spear-heads. The former have usually a leaf-shaped blade, about 6 inches in length, with a handle of horn, wood, or some other material, into which the blade is rivetted. Such daggers are found throughout Europe. The spear-heads of bronze exhibit a considerable variety. Some specimens have been found in Britain 27 inches in length. From the descriptions of Homer we know that almost all the Grecian armour, defensive and offensive, in his time was of bronze, although it is evident that iron was sometimes used in the time of Homer for making weapons, from the fact that he occasionally uses the Greek word for iron (*sidēros*) for a sword. Not the sword, however, but the lance, spear, and javelin, were the principal weapons of this age among the Greeks. The bow is not often mentioned, although a bow belonging to Pandarus is described in the Iliad, and in the Odyssey Ulysses is represented as very expert in the use of this weapon. Among the most ancient nations the Egyptians seem to have been most accustomed to the use of the bow, which was the principal weapon of the Egyptian infantry. The Egyptian bow was somewhat shorter than the height of a man; the arrow was usually made of reed, the head of bronze, but sometimes of flint. Peculiar to the Egyptians was a defensive weapon the object of which was to catch and break the sword of the enemy. With the Assyrians, also, the bow was a favourite weapon; but with them lances, spears, and javelins were in more common use than with the Egyptians. Most of the large engines of war, chariots with scythes projecting at each side from the axle, catapults, and ballistæ, seem to have been of Assyrian origin. All of those mentioned can at any rate be traced back to the Assyrians, to whom the invention of the catapult and the ballista was attributed by classical writers. During the historical age of Greece the characteristic weapon was a heavy spear from 21 to 24 feet in length. (See PHALANX.) The sword used by the Greeks was short, and was worn on the right side. The Roman sword was of Spanish

origin, from 22 to 24 inches in length, straight, two-edged, and obtusely pointed, and as by the Greeks was worn on the right side. It was used principally as a stabbing weapon. On the Trajan column, belonging to 114 A.D., the sword appears considerably longer than that used at an earlier period. The Roman sword was originally of bronze, but like all other offensive weapons among the Romans was always of iron in the time of Polybius (second century B.C.), when bronze continued in use only for defensive armour. The characteristic weapon of the Roman soldier was the pilum, which was a kind of pike or javelin, about 5 or 6 feet in length, with a wooden shaft and an iron head, the latter of which was about one-third of the length of the whole. The pilum was sometimes used at close-quarters both as an offensive weapon and as a means of parrying blows, but more commonly it was thrown along with the other javelin, which every Roman spearman (hastarius) carried, when within 10 or 15 paces of the enemy. The pilum, when thrown from this distance, would fix itself in the enemy's shield, whereupon the Romans would rush up, and seizing hold of the shafts of their pila draw down the shields in which they were fixed, and follow up the attack with their swords. In addition to the large engines of war that have been already mentioned as of Assyrian origin (scythe-chariots, catapults, and ballistæ), the Romans made use of battering-rams for making breaches in the walls of fortified places. The Greeks are said to have used a sort of cannon made on the principle of the modern air-gun. The Romans also employed caltrops to embarrass the movements of an enemy's cavalry.

The principal pieces of defensive armour used by the ancients were shields, helmets, cuirasses, and greaves. No shields were carried by the Egyptian archers; but the Egyptian spearmen had large shields, rectangular below and semicircular at the top, and with a round sight-hole in this semicircular part. In the heroic age of Greece the shield is described as of immense size, so as to be capable of defending the whole body. In the early monuments the shield is still large, though not so large as it appears to have been in the heroic age. In shape it is round or oval, with a very considerable degree of convexity. At the time of the Peloponnesian war a still smaller shield came into use. The Romans had two sorts of shields—the *scutum*, a large oblong rectangular highly convex shield, carried by the legionaries—and the *parma*, a small round or oval flat shield, carried by the light-armed troops and the cavalry. In the declining days of Rome the shields became larger and more varied in form.

The helmet was a characteristic piece of armour among the Assyrians, Greeks, Etruscans, and Romans. Like all other body armour it was usually made of bronze. The Assyrian helmet was frequently conical. Sometimes it had the form of a truncated cone, and sometimes the pointed extremity was curved forward. The helmet of the historical age of Greece was distinguished by its lofty crest, which tapered downwards to the back of the neck. The Etruscan helmet was also very high-crested, and sometimes had a wing rising to a considerable height on either side from points near the summit. The Roman helmet in the time of the early emperors fitted close to the head, and had a hollow neck-guard and hinged cheek-pieces fastened under the chin, and a small bar across the face for a visor. The neck-guard and cheek-pieces were not peculiar to the Roman helmet, but were in common use wherever the helmet was worn. In later days the helmet of the Romans had a higher crown than that of the early emperors.

The cuirasses of the Assyrians were close-fitting tunics made of several layers of flax plaited or interwoven and glued together. This kind of cuirass was introduced into Greece during the Peloponnesian war and was sometimes used even by the Romans. Before the Peloponnesian war the Greeks had the upper part of their body defended by bronze cuirasses. The defensive body-armour of the Egyptian archers consisted of a quilted coat. The Egyptian spearmen had cuirasses of bronze scales or quilted with bands of metal. Under the Roman Republic all the legionaries wore a bronze cuirass, consisting of a breast and back plate, with a border of pendent leather straps defending the lower part of the body. On the columns of Trajan and Antonine this cuirass is given only to officers, the legionaries wearing at that period only leather or linen cuirasses, on which circular plates of metal and metal shoulder-pieces were sewed, and to the lower border of which were attached oblong plates which served the purpose of the leather straps of the other cuirass. In the time of Trajan and Septimius Severus a flexible cuirass was added to the equipment of the Roman knight or horseman. This was made either of scales (*lorica squamata*) or of chains (*lorica hamata*). One of the latter kind has been found at Avenches in Switzerland, and is there exhibited.

Greaves do not seem to have been worn by any of the eastern nations except the Persians, whose defensive armour resembled pretty closely that of the middle ages. The greaves of the Greeks (*knēmides*) were made in two pieces which were fastened together by clasps. The Roman greaves (*ocreæ*) were made in one piece and were often worn only on one leg. The Samnite practice was to wear the greave upon the left leg, which is the leg advanced in fighting with a shield on the left arm; but Vegetius mentions that the greave was worn by the Roman legionaries upon the right leg. The greave reached only from the knee to the ankle. The Roman soldiers had their feet protected by shoes set with nails (*caligæ*).

The favourite weapons of the Germanic races, by which the ancient civilization of Rome was to a large extent overthrown, were the battle-axe, the lance or dart, and the sword. Their defensive armour consisted almost exclusively of a shield made of plaited osier covered with leather and generally 8 feet by 2 in size. Afterwards it was made round and bound with iron, and had several prominent bosses on its surface. The Frankish form of the German battle-axe was called *francisca* (francisque), and was the characteristic weapon of that tribe. It had a broad single-edged blade and a short haft, and was often used as a missile. The lance or dart of the Franks, called *angon*, closely resembled and was used exactly in the same way as the Roman pilum. The sword among the Franks was only a horseman's weapon. The shield of the Franks was round. Hardly any body armour (scarcely even a helmet) was used by them until the Carlovingian days.

Swords belonging to the early iron age in Scandinavia are frequently found in the mosses of Schleswig. They are long, straight, two-edged, and often richly damascened. Shields belonging to the same district and epoch were made of wood, and were flat, round, and from 22½ to 44 inches in diameter. They were bossed and otherwise mounted, generally in bronze, sometimes in iron.

The common arms of the Anglo-Saxon infantry were a spear, an axe, and a scramasax (a heavy single-edged knife). With the Anglo-Saxons as with the Franks the sword was specially a horseman's weapon, being carried by none under the rank of thane. The sword carried by them was 3 feet long, broad in the blade, and round at the point. The Saxon shield was round or oval, made of wood covered with leather, and furnished with a high conical boss.

The arms and armour both of the Normans and Anglo-Saxons, but especially of the former, at the time of the Norman conquest of England are pretty fully illustrated by the Bayeux tapestry. On this work the horsemen appear armed with long lances as well as swords. The Normans are represented as well furnished with archers and cavalry, of which arms the Saxons do not seem to have had any. Maces, clubs, axes with shafts from 4 to 5 feet long, are seen in the hands of both. The shields are long, rounded above and tapering to a point at the bottom. The body armour consists of a long hauberk ringed or trellised. The helmet is conical and has a sort of tongue in front which comes down over the nose.

Chain armour of interlinked rings came into use at the time of the Crusades and continued in use till the beginning of the fourteenth century. From the latter date to early in the fifteenth century mixed chain and plate armour was in use, and from about the year 1410 to the beginning of the next century the body armour was entirely of plate, and complete suits of plate armour did not altogether go out of use for another century. Below the waist the body was protected by taces, a series of narrow overlapping plates attached to a lining of leather. After the introduction of complete suits of plate armour the chief modifications consisted in the strengthening of the weakest parts, especially on the right side. By the end of the fifteenth century plate armour had attained its highest development, even the horses at that period being protected by plate armour everywhere except on the legs. By this time, in fact, the fabrication of armour had reached such a degree of perfection that it was scarcely possible for men-at-arms engaged in combat to find any spot where the armour of their antagonist could be pierced. Combatants equipped in this manner aimed accordingly less at wounding than at unhorsing one another, for a man-at-arms unhorsed was at the mercy of his antagonist, who, if he could not find any weak point where he could pierce the armour of his fallen foe, might beat him to death with the heavy mace with which he was armed. Many savage encounters of this nature are recorded by the chroniclers of the time. Usually, however, a man-at-arms when unhorsed became the prisoner of his conqueror, and many battles were decided, especially in the wars between the states of Italy, carried on by means of mercenaries, almost or altogether without the shedding of blood either on the side of the vanquisher or the vanquished. When body-armour had come to be manufactured with such perfection shields were almost entirely discarded. In England, indeed, no effigy has been found representing a man-at-arms bearing a shield of later date than the last quarter of the fourteenth century, from which it would seem that that defence had gone out of use even before the adoption of complete suits of plate-armour. Perhaps the most characteristic portion of the body-armour of the fifteenth century was that which protected the feet. The coverings for the feet during this period were laminated *sollerets* (as they were called), acutely pointed or rounded off at the toes. In the following century these were succeeded by *sabbatons*, cut off square at the toes. In this century the armour generally gradually became less rigid and cumbrous, and often consisted of small plates of metal quilted within linen or other tissues. As the century advanced the manufacture of body-armour declined, and after the close of the century armour was worn as much for show as for real service. Metal cuirasses gave place, as a rule, to buff suits and jerkins, although the former armour is not entirely disused even at the present day. See CUIRASS.

The principal weapons of the man-at-arms were the lance, sword, battle-axe, and mace, all of which were remarkable for their massiveness, as might be expected from the resistance they had to meet. The lance (see LANCE and TOURNAMENT) was the weapon which he used to unhorse his antagonist if he could not wound him with it. Two-handed swords were in common use in the sixteenth century. The sword-breaker, consisting of a deeply-notched blade about 15 inches in length, and intended to catch and break the sword of an antagonist, belongs to the same period.

During all the time that the use of heavy armour prevailed, the horsemen, who alone were so armed, formed the principal strength of armies; and so much was this the case that infantry were generally regarded as of hardly any account. An exception must, however, be made in the case of England, the archers of which were almost at all times, before the invention of gunpowder, an important and sometimes the chief force in the army. It has been already mentioned that the Bayeux tapestry furnishes us with evidence of the fact that the Normans were provided with archers at the time of the conquest. The bows used by them were small, being little more than a yard in length. The deadly weapon afterwards used by the English archers was from 5 to 6 feet in length, and the arrow discharged from it was itself a yard long. The bow used in Germany as well as that used in Italy (where steel was the material of which it was usually made) was about a yard and a half long. There is no evidence of the cross-bow having been used before the eleventh century. Its use against Christians was forbidden by the council of the Lateran in 1139. The long-bow continued in general use in England till the end of the reign of Elizabeth, and even as late as 1627 there was a body of English archers in the pay of Richelieu at the siege of La Rochelle. The cross-bow did not go out of use in the French army till the seventeenth century. Among the other hand-arms in use before the invention of gunpowder were the sling and the fustibale, which was nothing else than a sling with a handle to it. The large engines of war used in the middle ages were the same as those that had been employed by the Romans, with only slight modifications. A coat made of leather or quilted stuff, called in French *gamboison* or *gambeson*, was almost the only defensive armour of the foot soldier during the greater part of the period of which we are now treating.

The use of gunpowder as a means of discharging projectiles and the gradual improvement of firearms effected in course of time a complete change in all the methods and accessories of warfare. Details regarding the construction and recent improvements of large and small firearms and projectiles will be found in the articles BOMB, BULLET, CANNON, GUN, MUSKET, RIFLE, SHELL, &c. In the present article there is space only for the mention of a few of the leading facts in the history of those weapons. Gunpowder was not used in Europe to discharge projectiles till the beginning of the fourteenth century. Cannon are first mentioned in England in 1338. There seems to be no doubt that they were used by the English at the siege of Cambrai in 1339. All early cannon were breech-loaders. In the oldest form the breech consists of wedges of wood or metal, and this form was succeeded by cannons with movable breech-piece. The projectiles first used for cannon were of stone. Field-guns were introduced in the course of the fifteenth century. A rifled cannon of the sixteenth century is to be seen in the museum of the Hague. Mortars were introduced into the French army in 1634. Hand firearms date from the fifteenth century. The Swiss at the battle of Morat

in 1476 are said to have been provided with 6000 arms of this kind. In England the yeomen of the guard were armed with them in 1485. At first they required two men to serve them, and it was necessary to rest the muzzle on a stand in aiming and firing. Lighter hand-firearms called petronels seem to have been first used by cavalry. Hand-firearms were at first fired in the same way as cannon, by means of a slow-match carried in the hand and applied to the powder at the touch-hole. The first improvement was the invention of the match-lock about 1476. In the match-lock the slow-match was held at the end of one arm of a bent lever attached to the side of the piece in such a manner that by the action of a trigger it could be brought down upon the powder in the pan at the touch-hole. This kind of lock was superseded by two others, the wheel-lock and the snaphance, that seem to have been invented about the same time early in the sixteenth century, although the match-lock continued in use long after that date, and, indeed, was not altogether abandoned till the beginning of the eighteenth century. The wheel-lock is generally said to have been invented at Nürnberg, and was largely used in Germany. It consisted of a steel wheel which was made to revolve by a spring, and in revolving struck fire from a flint, and at the same time lifted a cap which kept the powder in the pan from being wet by rain or blown away by the wind. The chief objection to it was that it was slow in its operation, as the spring had to be wound up every time it was used. The snap-hance was largely used in the Spanish dominions. It was the immediate predecessor of the flint-lock, from which it differed only in making the flint strike against a fixed upright piece of iron in front of the powder-pan, while in the flint-lock this upright piece was attached to another piece that covered the pan and which turned on a hinge, so that when the flint descended and struck sparks from the iron it at the same time uncovered the pan. The flint-lock was invented in France about 1640, and gradually came into universal use, until it was itself superseded by the percussion-lock. This last was patented by a Scotch clergyman named Alexander Forsyth in 1807, and had been adopted everywhere by the year 1820. The first model of the needle-gun was made in 1827. It was first made breech-loading in 1836. The magazine rifle established itself about 1886–90. The only important weapon not a firearm invented since the introduction of gunpowder is the bayonet, which is believed to have been invented about 1650. The socket-bayonet, fitted round the muzzle of the gun, was introduced into the French army by Vauban.

The earliest collection of arms and armour was that made by Louis XII at Amboise in 1502. There is a fine collection at Dresden, begun in 1553. Among others may be mentioned the Ambras collection, commenced in 1570, now at Vienna, and those at Turin, St. Petersburg, Madrid, Windsor Castle, the Wallace Collection (London), and that in the Tower of London. The last mentioned was classified by Dr. Meyrick, and catalogued by J. Hewitt. Among works specially devoted to the subject of arms and armour are Grose's Treatise on Ancient Armour and Weapons (4to, 1785–86; Supp. 1789; afterwards annexed to the second edition of the same author's Military Antiquities, 1801); Sir Samuel Meyrick's Critical Inquiry into Ancient Armour as it existed in Europe, but particularly in England, from the Norman Conquest to the reign of King Charles II (three vols. 4to, 1824); Brett's Ancient Arms and Armour (1894), a historical and descriptive illustrated work; and Laking's The Armoury of Windsor Castle, European Section (1904), another handsomely illustrated and expensive work. An excellent compendium on the subject by Auguste Demmin was published in 1869 in French, English, and German. The title of the English edition is Weapons of War; it gives a history of arms and armour from the earliest period. Another useful manual is that by C. Boutell.

ARMSTRONG, JOHN, a poet and physician, was born at Castleton, in Liddesdale, Roxburghshire, where his father was a minister, about 1709. He was educated for the medical profession at the University of Edinburgh, under the elder Munro. In 1732 he took the degree of M.D. with much reputation, the subject of his treatise being Tabes Purulenta. He had ere this period addicted himself to the composition of verses. We are informed that, to relieve the tedium of a winter spent in 'a wild romantic country' —probably Liddesdale, the place of his birth—he wrote what he intended for an imitation of Shakspere, but which turned out to resemble rather the poem of Winter, then just published by Thomson. The subject of the two poems was the same. In 1735 he published in London, where he had gone to reside, a humorous attack upon empirics, in the manner of Lucian, entitled An Essay for Abridging the Study of Physic. The essay, besides its sarcastic remarks on quacks and quackery, contains many allusions to the neglect of medical education among the practising apothecaries. In 1737 he published a serious professional piece, styled, A Synopsis of the History and Cure of the Venereal Disease (8vo). He probably designed the work as an introduction to practice in this branch of the medical profession; but it was unfortunately followed by his poem, entitled, The Economy of Love, which, though said to have been designed as merely a burlesque upon certain didactic writers, was justly condemned for its warm and alluring pictures, and its tendency to inflame the passions of youth. After it had passed through many editions he published one in 1768, in which the youthful luxuriances that had given offence to better minds were carefully pruned. In 1744 Dr. Armstrong made some amends for this indiscretion by publishing his Art of Preserving Health, a didactic poem, in blank-verse, extending through four books, each of which contains a particular branch of the subject. This very meritorious work raised his reputation to a height which his subsequent efforts scarcely sustained. In 1746 he was appointed physician to an hospital for soldiers, and in 1760 he was appointed physician to the forces which went to Germany. This last appointment was obtained for him by Wilkes, with whom he was then on friendly terms; but their friendship did not stand the tug of political warfare. After his return to London he published a collection of his Miscellanies, which contained, however, nothing valuable. He afterwards visited France and Italy, and published an account of his tour under the name of Lancelot Temple. His last production was a volume of Medical Essays. He died in 1779 of an accidental hurt.

ARMSTRONG GUN, a kind of rifled cannon, introduced about 1857, named from its inventor, then Mr., afterwards Lord Armstrong. The Armstrong gun of the original type is constructed in the following manner:—Bars of wrought-iron, having a width of 2 inches, are raised to a white heat and then twisted round a steel bar or core, and other bars are twisted successively over these till the requisite degree of thickness and strength is obtained. The various layers of bars are then firmly welded together at a white heat by the steam-hammer. Two or more of these welded masses, each of them having a length of about 3 feet, are trimmed and adjusted at the ends, which are brought close together, and are united by a ring of wrought-iron, bound round them at a white heat.

The steel bar which formed the core of the gun is now removed, and the sides of the bore rifled with upwards of forty small close grooves. The advantages secured by the Armstrong gun were at once manifest as of the highest importance. Its range exceeded 9000 yards, or upwards of 5 miles, being about three times the extent of that of an old-type cannon. Its precision of firing is also remarkable; and a target 9 feet square, placed at distance of 4000 yards, has been hit 90 times in 100. At 1000 yards' distance an Armstrong gun has hit every time an object which, aimed at by the same gunner with an old 32-pounder, has been missed fifty-six times out of fifty-seven. Another great advantage possessed by this description of gun is its lightness, an ordinary 32-pounder weighing 56 cwts., while Armstrong's 32-pounder weighs only 26 cwts. Lastly, the charge of powder required is only about half the quantity necessary for an ordinary cannon, and the number of times which the piece may be discharged without exhibiting any injury far exceeded anything which had been recorded in the history of gunnery. Modern guns are mostly built up on Armstrong's principle.

ARMY. Among most nations of antiquity all men capable of bearing arms were liable to be called on to serve as soldiers. The Egyptians, Indians of Aryan race, and Israelites are, however, to be excepted. In the first two of these nations the warrior formed a separate class or caste of the community, ranking next in dignity and influence to that of the priests. In Egypt the military caste, composed, Herodotus tells us, of Hermotybians and Calasirians (in inscriptions Klaslor), shared with the king and the priests the whole of the soil. The members of the caste were interdicted from all handicrafts. The Egyptian infantry was mainly composed of archers. Foreign auxiliaries were also employed, but were kept in a strictly subordinate position, except under the last native kings of Egypt; and the different policy pursued by them was without doubt in a great measure to blame for the easy conquest of Egypt by Cambyses. In India the members of the warrior caste were called Kshatriyas, and after the complete subjugation of the non-Aryan inhabitants whom they found in the peninsula when it was invaded by them, seem generally to have lived an indolent life, supported partly by their private estates and partly by the royal bounty. Among the Israelites the only portion of the male population exempt from military service was of the tribe of Levi. In the other tribes all men above twenty might be called upon to serve in the army when occasion required. At first the army of the Israelites consisted entirely of infantry. David introduced charioteers, and Solomon added a regiment of cavalry. In later times an Egyptian auxiliary cavalry is sometimes found serving in the Jewish armies. The commencement of a standing army was made by Saul, who raised a body-guard of 3000 men. Solomon had an army of 20,000. After the captivity a new organization developed itself under the Maccabees. John Hyrcanus raised an army of foreign soldiers, chiefly Arabs.

From the monuments found in the valleys of the Euphrates and the Tigris we learn that at an early date the Assyrians, Babylonians, and Medes possessed armies composed of infantry, cavalry, and charioteers, and divided into light and heavy armed troops, which were distinguished by dress, equipment, and arms. But it was after the establishment of the Persian Empire that the army-system of the East attained its highest point of development. The earliest campaigns of this nation (under Cyrus) were indeed nothing else than armed migrations of part of the nation. The army, as might be supposed in the circumstances, was made up of all who were fit for war; and it may be mentioned that the bulk of this force was mounted. But when the Persians had extended their empire over almost the whole of western Asia it was necessary to maintain a standing army to keep down the conquered tribes and to guard the frontiers. The various sections of this army were each levied in the province to which it belonged, and was partly stationed in fortified towns, partly distributed over the country districts. Their pay was derived from the revenues of the province, but their commanders were wholly independent of the satraps or provincial governors. Yearly reviews were held in order to see that they were constantly kept in a state of efficiency. The troops of the standing army included a light and a heavy infantry, as well as strong bodies of cavalry, part of whom were clad in armour. The subdivisions of the army (both cavalry and infantry) were according to the decimal system. Originally all the forces were Persians, but in later times Asiatics and Greeks were also enrolled. Express messengers, stationed throughout the empire at the distance of a day's journey from one another, formed the means of communication between the different parts of the army. In addition to this provincial force the king had a body-guard of 10,000 men, called the immortals, from the fact that their numbers were always kept full. When great expeditions (such as the invasions of Greece) were undertaken a levy of the whole people was made. Fifty-six nations, according to Herodotus, were represented in the levy made by Xerxes for his celebrated Greek expedition.

In the small free states of Greece the armies consisted of a civic militia, in which it was the right and duty of every freeman to serve. In times of emergency the slaves also were armed. The most numerous single army ever mustered by the Greek states was that which was collected on the field of Platæa in 479 B.C. to oppose the Persians. It numbered 111,000 men, 37,000 of whom were Spartan Helots. The Greek armies often consisted exclusively of infantry. Athens never had more than 1000 cavalry. The foot-soldiers were divided into *hoplitai*, or heavy-armed, whose equipments consisted of a long lance, a sword, and a large shield; *peltastai*, armed with a short spear, and carrying a small round shield; *psiloi*, carrying no shields, and armed only with javelins, bows and arrows, or slings; and *gymnētes*, also without shields, and chiefly composed of slaves and foreigners. The last two kinds of troops fought scattered, and were only employed to harass an army, receiving no share in the tactical operations of a regular pitched battle. On the march the Spartan Helots were employed to carry the arms and armour of their masters, while in the field they served as *psiloi* or *gymnētes*. The age for military service was twenty to forty at Athens and twenty to sixty at Sparta. In Athens, however, every youth was enrolled at the age of eighteen, although he was not liable to be called on for active service till he had reached the age of twenty. The command of the Athenian army was divided between ten generals, who were elected for one year, one by each of the ten Attic tribes, and each of whom had the chief command in turn for one day, when they were all present with the army. To obviate the manifest inconvenience of this arrangement nine of the generals were sometimes left behind, and sometimes one of the archons called the Polemarch took the field, in which case the duties of a commander-in-chief were in a great measure left to him. Until after the Peloponnesian war Athenian soldiers received no pay, but from that date a small pay was given to those in the field. At Sparta the command of the army belonged to the two kings,

and usually two armies were formed, each king having the command of one of them. When only one army was formed one of the kings remained at home. When the authority of the ephors virtually superseded the power of the kings two of these officials accompanied the armies in war, and formed a complete check on those who nominally commanded them. Although in Sparta, as in Athens, the army consisted of the free citizens generally, yet, as in the former city it was always kept ready for war, it constituted a sort of standing army. It was divided into five *moras* or regiments, one for each tribe. After the time of the Peloponnesian war it became more and more common for all the Greek states to employ mercenary troops, and the Greeks themselves often entered into foreign service. The Macedonian army originally resembled those of the Greek states in being no more than a civic militia. The Macedonian standing army was created by Philip, and from the time of Alexander was composed chiefly of mercenaries.

The Carthaginian armies consisted in large part, and indeed mainly, of mercenaries. The body-guard of the general, called the 'sacred band,' was, however, entirely made up of Carthaginians by birth, but was distinguished less by its valour than by the splendour of its equipments. In the army of Hannibal Gauls, Iberians, and Ligurians formed the main force; Numidian cavalry hovered on the wings; Balearic slingers and elephants led by Ethiopian masters were drawn up in front.

In Rome every citizen from the age of seventeen to forty-six was bound to serve in the army till he had made sixteen (or in emergencies twenty) campaigns on foot or ten in the cavalry, and no citizen could become a candidate for any magisterial office unless he had been ten years on foot or five mounted. Under the republic a levy took place every year soon after the election of the consuls (July 1). It was superintended by the military tribunes, who at once formed the new levies into legions. During the best times of the Roman army the troops were selected with great care, and the discipline and training of the legions were admirable, so that the Roman infantry (of which the legions were mainly composed) was the best the world had yet seen. The Roman cavalry, on the other hand was numerically weak, and was excelled by the Numidian, and still more so by the Parthian. Pay was given to the Roman troops from the time of the siege of Veii (406 B.C.). Under the empire a standing army was required for the maintenance of order in the interior and the defence of the frontiers. In the reign of Augustus the strength of this army reached 450,000 men. For further details regarding the organization of the Roman army see LEGION.

When the Roman Empire in the West fell to pieces, in consequence of the repeated inroads and settlement within its borders of German tribes, there was an end for the time to all regular army organization in Western Europe. The forces by means of which the Roman Empire had been gradually dismembered consisted, like the Persian hordes that 1000 years before had conquered Western Asia, of armed nations; but a new military organization, greatly inferior, however, to that of the Romans, grew up in process of time out of an institution common to all the German tribes. This was the practice followed by the chiefs of gathering round themselves bodies of retainers constantly ready to fight under them, in the expectation of being rewarded out of the spoils of conquest. As long as the Germans were confined to their original settlements outside the Roman Empire these bodies of retainers bore a small proportion to the total strength of the armed population (the Heermannie or Heerbann); but when extensive conquests of land were made within the Roman Empire more or less of the conquered territory was always seized by the conquerors, and the personal retainers of the conquering chiefs were often so richly rewarded that the retinues of the chiefs were rapidly swelled by the adhesion of those who hoped for equal gain. At first these grants were looked upon simply as rewards for past services, but soon they came to be given and received as pledges of future service, every person receiving a grant being bound to serve his chief in war whenever called upon to do so. In this way the feudal system, as it is called, gradually arose, and feudal armies finally superseded the national levies of the German tribes. (See FEUDAL SYSTEM.) When Charles Martel conquered the Saracens at Tours in 732 the transition from national to feudal armies was not yet accomplished, but it was almost completed under Charlemagne at the end of the same century. The chief strength of the feudal armies lay in the men-at-arms, who were all mounted, heavily armed, and protected by shields and defensive armour. So much was this the case that when the numerical strength of an army was estimated only the men-at-arms were counted. One consequence of the armies of the middle ages being constituted in this way was that in battle there were scarcely any opportunities for generalship and tactical manœuvres, and the result depended almost entirely on the personal strength and prowess of the combatants. It was not till the fourteenth century that infantry again came to be an important part of the national forces of a country. After the introduction of firearms, shields and armour ceased to be an effectual protection, personal valour and bodily strength became of less moment, disciplined armies were found to be necessary, and the knights entered these armies as officers. The military forces of the small states that rose up in Italy from the twelfth century resembled those of the states of ancient Greece in being at first nothing more than a civic militia. In later times hardly any troops were used but mercenaries led by *condottieri* (which see), and these at last were superseded by standing armies.

Among the countries of modern Europe the foundation of a standing army was first laid in France. In 1439 Charles VII. of France issued an ordinance called the ordinance of Orleans for the creation of a number of troops of horse (hence called *compagnies d'ordonnance* or ordinance companies), which were to be maintained by the cities and villages in war and peace. In 1448 the same king established a corresponding body of infantry called *Francs-archers*. Henceforward the feudal militia fell more and more into disrepute, and the vassals assembled their forces only on occasions of great emergency. The example of France was followed elsewhere, and during the wars of Francis I. and Charles V. at the beginning of the sixteenth century, France, Germany, and Spain were all in possession of considerable standing armies. These armies were all raised mainly by voluntary enlistment, compulsory levies being resorted to only under the pressure of exceptional circumstances. The usual practice was for the king to contract with some nobleman or gentleman for the raising of a regiment; but in the Thirty Years' war Gustavus Adolphus set the example of raising all his troops directly for his own service. In this same war, however, a whole army was raised for the emperor by a private gentleman (the celebrated Wallenstein), the emperor engaging to give him the command of it. Gustavus Adolphus was also the author of many reforms in army organization. He established smaller divisions, introduced lighter weapons, separated the pikemen from the musketeers, who had hitherto been

mixed together, and made many improvements in the artillery; by all of which changes quicker and more complicated movements became practicable. The soldier was more thoroughly drilled and reduced almost to a machine, while the responsibilities of the officers were increased.

The wars of Louis XIV. led to further improvements in military organization and tactics, and in a still greater degree to the increase of the size of armies. Instead of the 14,000 men maintained by Henry IV. of France, Louis XIV., after the peace of Nijmegen (1678) had on foot an army of 140,000 men. Armies were likewise increased by all the other powers of Europe except England and Holland, where the strengthening of the standing army was looked on with great jealousy, and till the time of William III. continually opposed by the representatives of the people as dangerous to freedom. Among the military powers that came to the front in the next century the new Prussian monarchy was perhaps the most conspicuous. Frederick William I. devoted all his energies to the creation of a strong military force, and his army of 80,000 was increased by Frederick II. to 200,000. The latter introduced the system which still prevails in Prussia, and is now extended to the whole German Empire, of localizing the different sections of his army. Each regiment was assigned to a certain district, which was bound to keep it at its full complement. Where voluntary enlistment did not suffice for this purpose resort was had to conscription; but this was applied only to the lowest classes of the community. The systems of drill now followed in all European armies are founded on that introduced into the Prussian army by Leopold of Dessau, who organized it under Frederick William I. Cavalry tactics were greatly improved by Frederick the Great himself, who also was the first to use horse artillery. The dividing of artillery into batteries is of about the same date, but is due to a Frenchman named Gribeauval.

Since the time of Frederick the Great a great change has taken place in the composition of armies through the reintroduction of the principle of the universal liability of all men capable of bearing arms to military service, or, in other words, through the raising of armies by a general conscription, which is now done in every European country except England. Conscription was first adopted by France in 1798, and it was by means of it that Napoleon was able to raise the large armies with which he overran and conquered a great part of the Continent. In 1808 it was adopted by Prussia, by which power it has been applied with greater rigour than by any other. In Prussia it was combined with the short-service system, a mode of training the population to arms suggested by Napoleon's attempt in the peace of Tilsit to limit the Prussian army to a certain strength. This system consists in requiring those serving in the active army to remain under arms for a comparatively short term (say two or three years), during which they become thoroughly trained soldiers ready for active service on any emergency. Every year a certain number return from the army to civil life, and are replaced by others who are subjected to military training for the same term. By this means Prussia, while never maintaining a larger active army than that prescribed by the peace of Tilsit, was able to train its whole able-bodied male population to arms, and that without allowing the fact to be discovered until it was made manifest by the war of revenge in 1813. In other countries where the principle of conscription had been adopted its operation was greatly weakened by the numerous exemptions that might be obtained, and especially by allowing those required to serve to obtain exemption by paying for a substitute. Especially was this the case in France, where, under Napoleon III., the army had again become to all intents and purposes a professional one. In army organization the principal change that has been made since the introduction of conscription has been the establishment of army-corps (*corps d'armée*), that is, divisions of an army composed of all arms (infantry, cavalry, and artillery), and placed under the command of a single general. These divisions were first established by Napoleon, who placed them under the command of his marshals. The division was afterwards adopted by Prussia and extended to the German Empire, where the further improvement is made of localizing each army-corps in a certain province or member of the empire, in which it is reunited, and in which are kept all the arms and other equipments necessary for its mobilization. In the Prussian army the cavalry are very numerous, and are used principally on the march, when they are sent in front to cover the advance of the main body of the troops, and to collect information. In all armies considerable changes in tactics have resulted from the increased range, precision, and rapidity of fire of the improved artillery and musketry now in use.

To the foregoing general sketch of ancient and modern armies it will be well to add an account of the history and present organization of the British army. Before the Norman conquest the armed force of England consisted essentially of a national militia (called *fyrd*), available only for home service; but the king and some of the great earls maintained bodies of troops out of their private means. William the Conqueror introduced the feudal system, and after the preparation of the Domesday Book in the twentieth year of his reign he was able to carry out that system with a completeness never equalled in any other country. He parcelled out the whole of the soil into upwards of 60,000 knights' fees, and held every tenant of a fee bound to attend his lord with horse and arms at his own cost for forty days in each year. When one man held many fees (as was often the case) he was bound to furnish the king with one fully equipped horseman for every knight's fee that his land contained. (See ENGLAND—Institutions under the Norman kings.) By this arrangement the king could command at any time the services of 60,000 cavalry for forty days in a year without any cost to himself. In course of time it became customary for the king, when the holder of a fee was unable or unwilling to render the service required by his tenure, to accept instead a pecuniary fine (escuage); and these fines enabled the king either to pay additional troops or to pay the feudal troops to prolong their service beyond the forty days for which they were bound. The feudal army thus created by William almost entirely superseded the national levies of the Anglo-Saxon period, yet these were not altogether given up, and have survived to the present day in two institutions, the *posse comitatus* and the *militia*. The *posse comitatus* received the organization of an army on two occasions, first by Henry II. in 1181, and again by Edward I. in 1285. Partly owing to this and partly to other causes, it happened that during the prevalence of the feudal system, in spite of the completeness with which it was established in England, the lower orders were nowhere so warlike and so used to arms as in that country. The armies with which the English carried on their wars with France were mostly made up of paid troops, one reason for which was that the campaigns in these wars necessarily lasted for a longer period than that for which the king could command the services of his feudal army. Sometimes forced levies were resorted to, but these were always resisted

as illegal. When paid troops had to be raised, the king usually contracted with some of his most wealthy subjects, nobles or others, to levy the number required. The funds out of which they were maintained were partly derived from the royal revenues, partly from the fines raised by the system of escuage, and partly from grants from Parliament. At first foreign mercenaries were sometimes included in the troops so raised, but in later times the armies of England were always national. The feudal cavalry of course were always represented to a greater or less extent in these armies; but the infantry troops, mainly composed of archers, were a far more formidable force than in the armies of any other country, and to them the victory was often due.

From the accession of Charles I till the reign of William III the army was a constant cause of dispute between the king and the Parliament, who feared that a standing army would be used, as it was elsewhere, as an instrument of tyranny. The raising of forced loans to maintain troops, the practice of billeting soldiers upon the people, and the institution of martial law were the main subjects of complaint in the Petition of Rights. Under the Commonwealth the first standing army was maintained, but notwithstanding the respect which Cromwell was able thereby to secure for the English name abroad, military government was dreaded as much as ever by the people, and hated all the more on account of the experience they had had of it; so that after the Restoration the standing army was reduced to the guards, besides what was necessary for two or three garrisons. The guards included the yeomen of the guard, Monk's regiment (now called the Coldstream Guards), and two regiments of life- and one of foot-guards. During the reign of Charles II the forces of England were increased by the addition of a few other regiments, among which was the 1st or Royal Scots, originally the Scottish guard of the kings of France, which was transferred to England shortly after the Restoration. After Monmouth's rebellion in the reign of James II there was maintained in England a force of 20,000 men, a large part of which had been levied in Ireland. At the Revolution this army was to a great extent disbanded, and all the Irish troops that had been raised were sent home. The Bill of Rights declared the keeping of a standing army within the kingdom except with the consent of Parliament to be unlawful; but before William could be securely seated on the throne Parliament found it necessary to grant that consent in order to subdue the adherents of James in Ireland, and in the first year of William's reign the army was formally recognized on the basis on which it still exists, that its pay, and hence its strength, remain entirely under the control of the House of Commons. In the same year (1689) the Mutiny Act (which see), regulating the discipline of the army, was first passed. The consent of Parliament having been obtained for the maintenance of an army, the old regiments of James II were recognized, and had restored to them the numbers that James had given them, and which the most of them retained for a long time. A number of new regiments also were added. During the reigns of the first two Georges an artillery corps was organized, but the British army did not receive any considerable permanent addition till the wars with France consequent upon the Revolution. In the course of these wars fresh regiments were raised much as they had been in the French wars of Edward III. The crown contracted for the raising of a regiment with some distinguished soldier or gentlemen, who received a certain bounty for every recruit, and was appointed colonel of the regiment. In some cases the gentleman who engaged to levy a regiment, instead of accepting bounty money, received the nomination of all or some of the officers in the new regiment, and made good his outlay by selling the commissions, a mode of conferring commands in the army which had been in use from its earliest days. When a regiment was raised the colonel was responsible for keeping it constantly up to its full strength. The period for which the recruits enlisted was a matter of contract with the colonel: usually they engaged for life, sometimes for a term of three or five years, sometimes for the duration of the war. Regiments were also to some extent recruited by the compulsory enrolment of released debtors and criminals, and of paupers and vagrants. During the war the troops in the pay of Britain rose at one time to nearly a quarter of a million, but many of these were foreign. When peace was concluded the army was permanently increased from about 20,000, at which it had stood before the war, to an average of about 80,000. The next considerable increase in the normal strength of the British army took place after the Indian mutiny, when the white troops of the East India Company were amalgamated with the forces of the United Kingdom.

Many changes have since taken place, and our military forces as a whole have been largely increased in numbers. Yet the British army is regarded as a very costly and unsatisfactory machine, and in the past few years various schemes for its improvement have been proposed and partially brought into effect. Two important bodies of men long familiar as belonging to the military forces of the United Kingdom have ceased to exist, in their former organization at least, by an act passed in 1907; these are the militia and the volunteers, both belonging to what were spoken of as the auxiliary forces. The militia was a body of old standing specially enlisted to provide a body of trained or partially trained men, who, in case of need, could be relied on to supplement, support, or relieve the regular army at home (see MILITIA). The militia, by the above act, were practically converted into reserves of the regular army. Shortly after the Indian Mutiny the volunteer movement took its start, and for fifty years the volunteers formed an important body intended for home defence. The new act brought into existence (in 1908) what is known as the Territorial Force, and to it the volunteer forces were transferred, including also the mounted body known as Imperial Yeomanry, forming respectively the infantry and cavalry of the territorial army. The whole army is now divided into two main sections or divisions, the first line and the second line, the former consisting of the regular army and its reserves, the latter of the territorial army and its reserve. A part of the present scheme is that there should be an expeditionary force of some 167,000 men always ready for mobilization. Recruits enlist in the territorial force for not more than four years at a time, and the conditions of service are stricter than they were among the volunteers. The backbone of the army is of course the regular army, a body of permanently embodied troops, consisting of infantry, cavalry, horse, field, and garrison artillery, engineers, with the army service corps, army medical corps, &c. The total strength of the regular army at home and abroad, including reserves, is about 400,000, about 75,000 forming part of the Indian army. The total of men on the regimental establishments for 1910–11 was 802,000. The Indian army is administered and paid by the Indian government, but some 75,000 regular troops from Britain always form an important portion of the 230,000 men composing it. The British infantry of the line number about 172,000, the artillery 54,000, the cavalry 20,000. The strength of the territorial force is about

270,000, but its full complement should be over 312,000. The gross total of troops of all kinds belonging to the British Empire amounts to more than 1,000,000, but a large proportion of this force would be of little use for really defensive or offensive purposes. The normal annual expenditure upon the home army is now not less than £28,000,000 or £29,000,000. The numbers of troops in the different branches of the services, and the various items of expenditure, have to be laid before Parliament and passed by vote each year.

The army has long been administered under the department known as the War Office, with the secretary of state for war at its head, a minister responsible to Parliament for his actions. Formerly the commander-in-chief had also an important share in the military administration, but in 1904 the latter office was abolished, and a board, named the Army Council, was established to carry on the work of the War Office. At its head is the secretary of state, who is responsible to Parliament, and as his colleagues there are four military members and two civil members. A new and important post was at the same time created—that of inspector-general of the forces. Each member of the board has his own duties and responsibilities, the war secretary having the general supervision and direction. The first military member, the chief of the general staff, has to deal with the military defence of the empire, the training of the troops, education of officers, selection of the general staff, &c. The second military member, the adjutant-general, has to see to the recruiting and raising of the forces, their distribution and maintenance abroad, discipline, medical and sanitary matters, &c. The third military member, the quartermaster-general, has to see to the transport, remount, and supply services, clothing equipment, stores, &c. The fourth, the master-general of the ordnance, has to attend to arms and ammunition, the construction and maintenance of fortifications, artillery and engineer service, &c. The parliamentary under-secretary, as one of the civil members, has the supervision of barracks and hospitals, while the other civil member, as the financial secretary, is at the head of the financial department, having as his deputy and assistant the director of army finance. The inspector-general has to inspect every branch of military work and to report to the council. The actual command of the army is vested in generals specially appointed.

Viscount Cardwell, who was secretary of state for war in Mr. Gladstone's first ministry (1868–74), holds an important place in the modern history of the British army. He introduced the short-service system, organized the reserve, and inaugurated the system of localization. Since his time the army at home has been so organized as to provide, at least in ordinary times, a sufficient means of maintaining the strength of the army abroad. The unforeseen demands made by the South African war which began in 1899, however, not only served to show the defects of the War Office, but also made it clear that great changes were necessary if Britain were in the future to undertake any similar task. Conscription has been advocated by many, but no steps in this direction have yet been proposed by the War Office authorities. Under Cardwell's territorial system the kingdom was divided into numerous regimental districts, grouped in district commands. Under Mr. Brodrick's scheme of 1901 the kingdom was to be divided into six army-corps districts, namely, Aldershot, Salisbury Plain, Ireland, Colchester, York, and Scotland, each with troops of all arms in due proportions, the first three with regulars only, and the last three with militia and volunteers also. This scheme was partly carried out, four army-corps being constituted; but in 1904 a new scheme was introduced by Mr. Arnold-Foster, under which four so-called 'army-commands' took the place of the four army-corps—Aldershot, Southern, Irish, and Eastern—with three district commands in addition. Regimental districts were continued, each district being regarded as the recruiting ground of a territorial regiment. An important part of the scheme was to divide the regular army into two parts—a general service army and a home service army, the troops of the Aldershot command to form a 'striking force' ready for immediate service. Mr. (since 1911 Lord) Haldane introduced the system brought into existence by the act of 1907. The 'commands' are now Aldershot, Eastern, Southern, Western, Northern Scottish, Irish, with London as a district by itself.

The terms of enlistment as to period of service, &c., have varied greatly at different times, arrangements also being somewhat different in different branches of the service. By the scheme of 1902 nearly all recruits might enlist for three years' active service in the army and nine in the reserve, and if after two years the soldier elected to serve with the colours for eight years in all, his pay if efficient was raised to 1*s.* 6*d.* per day, every soldier over nineteen after passing recruit drill to receive in future at least 1*s.* per day (without stoppages). This scheme was intended to make the army more attractive and to secure a sufficient supply of men for the army reserve. In 1904 a new order was issued by which enlistments were to be for nine years with the colours and three in the reserve, daily pay rising to 1*s.* 1*d.* for a first-class shot. Enlistments are now for 6, 7, or 9 years in the ranks and 6, 5, or 3 in the reserve.

According to the regulations now in force the first commission that may be obtained in the cavalry and infantry is that of second lieutenant, which may be granted to several classes of candidates, as:—(1) to a candidate of age 18 to 19½ who, having passed an entrance examination, is admitted so far as cadetships are vacant, has gone through a course of instruction at the Royal Military College, Sandhurst, and has passed the qualifying examination, the course being of two years' duration; (2) to a university graduate or student by competition; (3) to certain officers from colonial military forces; (4) to a non-commissioned officer recommended for promotion and who shall pass such an examination as may be fixed. First appointments in the artillery and engineers are given similarly through the Royal Military Academy, Woolwich, entrance to which is obtained by competitive examination. When once appointed to a regiment the officers pass up the list and are promoted from rank to rank in regular succession, up to major inclusive, as vacancies occur, if considered duly qualified. The retirement of officers is either voluntary or compulsory. An officer with not less than fifteen years' service may—subject to rules laid down—be permitted to retire with retired-pay according to a certain scale. All officers must retire at fixed ages according to their rank, receiving corresponding retired-pay. Non-commissioned officers are appointed from the ranks, and must possess certain educational and professional qualifications. See also MILITIA, VOLUNTEERS, ARTILLERY, YEOMANRY, ARMY-CORPS, ARMY SERVICE CORPS, ROYAL ARMY MEDICAL CORPS (the last three in SUPP.), articles on the different countries, &c.

ARMY AGENT. See AGENT.

ARMY LIST, a monthly publication issued by authority of the War Office, containing a complete list of the officers of the British army in every branch, including the marines, yeomanry, volunteers, and colonial forces, a list of the changes gazetted during the past month, and certain other information.

ARMY SCHOOLS. See MILITARY SCHOOLS.

ARNATTO, or ANNOTTA. See ANNATTO.

ARNAUD, JACQUES ACHILLE LEROY DE SAINT, Marshal of France, born at Bordeaux, August 20, 1796. His father, named Leroy, was prefect of Aude under the republic and empire; but dying in 1803 left his family in rather straitened circumstances. Young St. Arnaud, after studying at the Lycée entered the army in 1816. Having been dismissed the service he led a rather chequered life for about ten years, but in 1831 was readmitted into the army and acted as orderly-officer to General Bugeaud against the revolted peasants of La Vendée. In 1836 he went to Africa, and was promoted in the following year to a company in the foreign legion. He highly distinguished himself at the storming of Constantine, and in consequence of his courage and the frequent mention of his name in despatches he was nominated one of the Legion of Honour. From that time he was regarded as one of the most rising officers in the African army. He was present at the taking of Djelli in 1839 and in the following year was severely wounded at the capture of the Arab fortresses at Monsaja. In 1841 he entered the newly-formed corps of Zouaves as *chef de bataillon*, and was afterwards appointed to the military command of Milianah, with the grade of lieutenant-colonel. In 1844 he was promoted to the rank of colonel of the Zouaves and charged with the command of the subdivision of Orleansville. The formidable insurrection of Bou-Maza gave Colonel St. Arnaud a new opportunity for distinguishing himself; and when he at last received the submission of the Arab chief, he was rewarded with the cross of Commander of the Legion of Honour and the rank of major-general. The revolution of 1848 and the fall of Louis Philippe had no effect upon St. Arnaud; he continued to acquire fresh reputation until he received the rank of general of division in 1851. On the 26th October in that year he was called by Louis Napoleon from the command of a division of the army of Paris to the cabinet, and was created minister of war, in which capacity he prepared everything for the military success of the *coup d'état* on the 2d December following; and for his share in that sanguinary affair he received the baton of a marshal of France on the next anniversary of the day on which it occurred. In March, 1854, he was appointed to the command of the French army in the war against Russia, and the activity of his preparations and the well-known energy of his character induced the most sanguine hopes that he would hurry it to a successful conclusion. On the voyage to the Crimea he was attacked by severe spasms of the heart, to which he had been previously subject; but he recovered sufficiently to direct the descent of his troops to the battle of the Alma and to record his impatient reproaches against the English for the tardiness of their movements. On the night of the 25th September he was seized with symptoms of cholera and was obliged to resign the command of the army to General Canrobert. He was carried with difficulty into Balaklava and thence on board the *Berthollet*, where he died on the afternoon of the 29th, just as the vessel approached the Bosporus. His remains were conveyed to France and interred in state at the Invalides, and a statue was afterwards erected to him in the Hall of Honour of the Lycée.

ARNAULD. From this old family of Auvergne, which belongs to the nobility *de la robe et de l'épée*, are here selected—1. ANTOINE, born at Paris in 1560, an advocate at Paris from 1580, a zealous defender of the cause of Henry IV., distinguished for several political pamphlets, and for his powerful and successful defence of the University of Paris against the Jesuits in 1594. By this he drew on himself the hatred of the Jesuits, but remained till his death in 1619 in possession of his honours, and was esteemed the greatest lawyer of his time. His numerous children formed the nucleus of the sect of the Jansenists (see JANSENIUS) in France.—2. ANTOINE, called the *Great Arnauld*, the youngest child of the lawyer Antoine Arnauld, born February 6, 1612, at Paris. Under the guidance of the abbot of St. Cyr, Jean du Vergier de Hauranne, first head of the Jansenists in France, he devoted himself to theology, and was received in 1641 among the doctors of the Sorbonne. In the same year he attacked the Jesuits in two works, De la fréquente Communion and La Théologie Morale des Jésuites, the first of which occasioned much controversy, because it applied the principles of the Jansenists to the receiving of the sacrament. He excited similar controversies by his work, De l'Autorité de St. Pierre et de St. Paul résidente dans le Pape (1645), by the opinion therein maintained, that the two apostles should be regarded as of equal rank, and as founders of the Roman Catholic Church. After 1650, when Jansenism had become an object of public odium and the watchword of an important party in the state, Arnauld engaged in all the quarrels of the French Jansenists with the Jesuits, the clergy, and the government, was their chief writer, and was considered their head. The intrigues of the court occasioned his exclusion from the Sorbonne (1656), and the persecutions which compelled him to conceal himself. In his retirement at the Port Royal he wrote, in conjunction with his friend Nicole, a system of logic (hence called the Port Royal Logic) on the principles of Descartes, and in conjunction with another member of the Port Royal named Lancelot, a Grammaire raisonnée, both of which works were for a long time esteemed as school-books. After the reconciliation between Pope Clement IX. and the Jansenists, in 1668, he appeared in public, and enjoyed the homage which even the court did not refuse to his merits and talents. He now attacked the Calvinists in many controversial tracts (Renversement de la Morale de Jesus Christ par les Calvinistes; L'impiété de la Morale des Calvinistes, &c.), and with his friend Nicole composed the great work, La Perpetuité de la Foi de l'Église Catholique touchant l'Eucharistie, in opposition to them. For this a cardinal's hat was destined for him at Rome; but as he scorned it, and as the court had become unfavourable to him, it was not conferred. On account of the new persecutions of the court, or rather of the Jesuits, he fled, in 1679, to the Netherlands. In his exile he renewed his controversies with the Calvinists and the Jesuits, and died in quiet at Brussels, August 9, 1694. He was a man of a vigorous and consistent mind, full of solid knowledge and great thoughts; in his writings, bold and violent to bitterness; undaunted in danger, and of irreproachable morals. He is acknowledged to have done much for the improvement of morality in the Catholic Church; yet would his genius have been far more useful to the church and to literature had not his situation and character involved him in a multitude of controversies, which rendered his literary activity, for the most part, fruitless to posterity. The works of Arnauld were published at Lausanne between 1775 and 1783, and again at Paris in 1843.

ARNAUTS, or ALBANIANS, a people of mixed origin, probably the primitive inhabitants of Illyria and Macedonia, intermixed with Goths, Huns, and Slavonians, who have spread in the western part of European Turkey, along the coasts of the Adriatic and Ionian seas, and have sent colonies to the Neapolitan and Sicilian coasts. They call themselves *Skipetars*, that is, inhabitants of the mountains; by the Turks they are called *Arnauts*. Their language has hardly risen to the dignity of a literary one. It is regarded as a descendant of the ancient Illyrian

language, and according to philologists forms an independent branch of the Indo-European family, but contains a considerable admixture of Greek, Roman, German, Slavonic, and Turkish words. The Arnauts in the coast towns generally speak Greek as well as their own language. The Arnauts are divided into several tribes, among whom the Suliotes in the south are partly of Greek origin. As regards religion they are divided between Christianity and Mohammedanism. They are frank towards friends and superiors, but allow themselves every kind of artifice and perfidy towards their enemies. The Tosks of southern Albania have in some respects not so good a reputation as the Gheggas of the north, but, owing to their contact with Greece, they are further advanced in civilisation. War is the favourite occupation of the Arnauts. For arts and trades they have no inclination. Agriculture they esteem not so honourable an occupation as arms. They form the finest body of troops in the Turkish army.

ARNDT, Ernst Moritz, a distinguished German poet, whose ardent patriotism and soul-stirring lyrics have enshrined him in the hearts of his countrymen, born at Schoritz, on the island of Rügen (then belonging to Sweden), on the 26th of December, 1769; died at Bonn, January 29, 1860. He was originally destined for the church, but afterwards abandoned this project and devoted himself to literature. His first important work was an account of a journey made by him in 1797–99 over a great part of the Continent, including Italy and France. In 1800 he began to lecture on history and philology at Greifswald, and as his lectures were well attended he was in 1801 appointed adjunct of the university, and in 1806 professor extraordinary. In 1807 he published at Altona the first part of his Geist der Zeit, in which he advocated, with the most impassioned eloquence, the rights of the German nation in opposition to the schemes of Napoleon, but exposed himself in consequence to that emperor's wrath, and was obliged to take shelter in Sweden. Three years afterwards he returned to his professorial chair; but, impelled by the desire of taking an active part in the war of liberation which the German patriots were then anxious to bring about, he resigned his professorship, and in 1812 proceeded to Russia. Here he made the acquaintance of the Baron von Stein, whom he accompanied during the campaign of 1813–14, through Germany and France to Paris. During all this period Arndt had been indefatigable in arousing, by his poetic effusions, the German youth to throw off the tyranny of the French; and his efforts in this respect were as successful as those of Körner. Among his patriotic songs it is sufficient to refer to his Was ist des Deutschen Vaterland? Der Gott, der Eisen wachsen liess, and Was blasen die Trompeten? Husaren heraus! which were caught up and sung from one end of Germany to the other. In 1817 he married a sister of the theologian Schleiermacher, and settled at Bonn in order to undertake the duties of professor of history in the university then organizing in that town. But his lectures had scarcely begun when he lost his chair, his liberal sentiments in politics having proved distasteful to the Prussian government, which he had contributed so effectually to establish. He was not restored to his chair till the accession of Frederick William IV. in 1840. In 1848 he was elected to the National Assembly which met at Frankfort, and in that body delivered a number of short but powerful speeches. The last years of his life were spent by him in dignified tranquillity, and presented a grand picture of a hale and active veteran, sound alike in body and mind, the Nestor of German nationality.

ARNE, Thomas Augustine, one of the best English composers, was born at London on Mar. 12th., 1710. He was educated at Eton and was intended for the study of the law, but a strong inclination led him to devote himself to music, which for a long time he was obliged to practise in secret, though his father was finally induced to yield to his wishes after he had made great progress in the art. Discovering that his sister, afterwards famous as Mrs. Cibber, had a fine voice and a great fondness for music, he prevailed on her to choose the profession of a singer. He composed a part for her in his first opera, Rosamond, after the text of Addison, which was performed in 1733 at Lincoln's-Inn Fields, and was received with great applause. Then followed Fielding's comic opera, Tom Thumb, or the Tragedy of Tragedies, altered to the Opera of Operas. His style in the Comus (1738) is still more original and cultivated. The public was delighted with his lively, cheerful, and natural melodies, and with the truth and simplicity of his expression. In 1740 he married Cecilia Young, an excellent singer, educated in the Italian school. They went in 1742 to Ireland, where they were well received. After two years he was engaged as a composer, and his wife as a singer, at the Drury Lane Theatre, in London. He composed several songs in 1745 for the Vauxhall concerts. To him we owe the national air Rule Britannia, originally given in a popular piece called the Masque of Alfred (1740), partly written by the author of The Seasons. After having composed two oratorios and several operas, one of which was called Eliza, and having received the degree of Doctor of Music at Oxford, he attempted a composition in the Italian style, taking Metastasio's Artaserse for his libretto. This composition was very popular, but his talents were better adapted to the simple and lively than to the grave and elevated. He composed, also, music for several of the songs in Shakspere's dramas, such as Where the Bee Sucks; Under the Greenwood Tree; and Blow, blow thou Winter Wind; and various pieces of instrumental music. His oratorios which were not so successful as his other works, were entitled Abel (1755), containing the popular Hymn of Eve; and Judith (1764). In a performance of the latter Arne first introduced female voices into the oratorio chorus. In several of his works he was his own librettist. He died on Mar. 5th, 1778.

ARNEE, a large animal of the ox genus, a native of India and the islands of the Indian Archipelago; by some naturalists regarded as a distinct species, by others as merely a variety of the buffalo. See Buffalo.

ARNHEM, or Arnheim, a town in Holland, in the province of Gelderland, 18 miles south-west of Zutphen, on the right bank of the Rhine. It was once fortified, but the fortifications have been converted into public walks. The environs of Arnhem are more agreeable than those of almost any other town in Holland, and hence it is much frequented by summer visitors. Among the chief buildings may be mentioned the Groote Kerk or high church, with the fine monument of Charles, duke of Egmont; the Prinzenhof, where the dukes of Gelderland formerly resided; the town-house, and the barracks. Its manufactures consist of cabinet wares, mirrors, carriages, mathematical and physical instruments, &c., and there are numerous paper-mills in the neighbourhood. Its trade, partly direct in grain, and partly transit to Amsterdam, Rotterdam, &c., is important. In 1795 it was stormed by the French, who were driven from it in 1813. Pop. (1904), 59,759.

ARNHEM LAND, former name of the peninsula on the north-west of the Gulf of Carpentaria in the Northern Territory of South Australia. The region

received this name from the fact that it was discovered in 1623 by the Dutch vessels *Arnhem* and *Pera*. The name is still attached to a cape on the east, and a bay on the north side of the peninsula.

ARNICA, a genus of plants of the natural order Compositæ, one species of which, the *Arnica montana*, grows in Europe, and is used in medicine, being known under the common name of leopard's bane. It is not found in Britain, but is abundant in the meadows and forests of mountainous districts in the middle and north of Europe. The root is perennial and crooked, the stem about 2 feet high, bearing on the summit flowers of a dark golden yellow. In small doses it acts as a stimulant, and as a diaphoretic and diuretic. It is employed in cases of low fever, in nervous diseases, and as a tonic. The tincture of arnica is applied externally with a very beneficial effect to wounds and bruises.

ARNIM, Elizabeth von, better known as Bettina, wife of the German novelist Louis Achim von Arnim, and sister of the poet Clemens Brentano, was born at Frankfort on the Main, 4th April, 1785. Even in her childhood she manifested an inclination towards eccentricities and poetical peculiarities of many kinds. Her warmth of sympathy led her, especially after she became acquainted with the canoness Günderode, into a fantastic worship of nature, and latterly into a real sickliness of feeling. The suicide of this lady, which was caused by an unhappy attachment to the philologist Creuzer, made a deep and lasting impression upon her, and her enthusiastic love of nature now became transformed into a kind of Platonic, child-like, and even affected love towards the poet Goethe. The poet, then about sixty years of age, did not reciprocate her feelings farther than by a tender forbearance for the wayward creature. After her marriage, in 1811, she lived partly at Berlin, partly at her husband's seat of Wiepersdorf. It was not till after her husband's death that she appeared as an author. In 1835 she published Goethe's Briefwechsel mit einem Kinde (Goethe's Correspondence with a Child), containing, among others, the letters that she alleged to have passed between her and Goethe. It has been generally stated that Goethe turned some of her letters into sonnets; but it is now known that the whole work is a fabrication. Her genius, amiability, and fascination made her house at Berlin one of the attractions of the metropolis, and assembled round her the chief literary characters of the day, even in her old age. Her later writings were of a politico-social character, and display the same sympathy and warm human feeling as her earlier, but also at the same time the gulf lying between her and the world of real life. She died at Berlin, 20th January, 1859.

ARNIM, Ludwig Achim von, a German litterateur, born at Berlin in 1781, first devoted himself to natural science, and published a work on electricity, but soon changed the direction of his studies, and distinguished himself as a writer of novels, which enjoy great popularity in Germany. In 1811 he married Bettina Brentano, the well-known enthusiast for Goethe, and in concert with her brother, Clemens Brentano, published a collection entitled Des Knaben Wunderhorn. He died in 1831. His complete works have been published in twelve vols. by W. Grimm.

ARNO (anciently *Arnus*), one of the largest and finest rivers of Italy, which divides Tuscany into two parts, and washes Florence and Pisa. The Arno rises in the Apennines, on the east of Florence, near a village called *S. Maria della Grazia*, on the borders of Romagna, 15 miles west of the sources of the Tiber; it then turns southward towards Arezzo, where it is increased by the lakes of the Chiana; after which it runs westward, dividing Florence into two parts, and at length washing Pisa, falls, 4 miles below it, into the Tuscan Sea. This river has been sung by many poets, on account of the beautiful banks between which it meanders, and the cities with which they are adorned. From any hill in the neighbourhood of Florence, or at the confluence of the Chiana, the view into the valley of the Arno is charming. In ancient times the Etruscans erected here extensive works of hydraulic architecture, long before any other Italian nation had arrived at such a degree of civilization. In the time of Napoleon the Arno gave its name to an extensive and populous department in the *grand empire*, Florence being the capital. The pop. amounted to about 600,000.

ARNOBIUS THE ELDER, called also the *African*, was, about A.D. 300, teacher of rhetoric at Sicca Veneria in Numidia, and in 303 became a Christian. He died about 326. While yet a catechumen he wrote seven books of Disputationes adversus Gentes, in which he refuted the objections of the heathens against Christianity with spirit and learning. This work betrays a defective knowledge of Christianity, but is rich in materials for the understanding of Greek and Roman mythology. Hence it is one of the writings of the Latin fathers which, like the works of his disciple Lactantius, are particularly valued by philologists. The best editions are those of Orelli (Leipzig, 1816), and Hildebrand (Halle, 1844). From the younger Arnobius, a Gallic divine in the last half of the fifth century, we have only an insignificant Commentary on the Psalms, which betrays the principles of the Semi-Pelagians.

ARNOLD, Benedict, a general in the American army during the contest of the colonies with Great Britain, who rendered his name infamous by an act of treachery which he endeavoured to perpetrate. He was born at Norwich, Connecticut, in 1740, of obscure parentage. On the breaking out of the revolutionary war he took the command of a company of volunteers at New Haven, and soon won a high military reputation. Along with General Montgomery he was intrusted by Washington with the command of the expedition to Canada in 1775, and displayed on that occasion a considerable amount of intelligence and personal bravery. On the evacuation of Philadelphia by the British in 1778 Arnold received orders from Washington to take possession of that city. In this charge he displayed so much oppression and extortion towards the inhabitants, that a representation on the subject having been made to Congress, he was brought before a court-martial, and condemned, January 20, 1779, to be reprimanded by the commander-in-chief. From this moment Arnold nourished an implacable hatred towards the cause which he had so brilliantly defended, and being afterwards defeated in an appeal to Congress from the decision of the commissioners appointed to settle certain claims of his in connection with the expedition to Canada, he determined to betray his country, and accordingly entered into communications with Sir Henry Clinton, the British general. Having obtained command of the strong fortress of West Point, he formed the design of betraying it into the hands of the British, with all the arms and immense stores which were deposited there. To John André, a young officer who acted as his aide-de-camp, Sir Henry Clinton committed the business of negotiating with Arnold. A correspondence ensued between Arnold and André, under the fictitious names of *Gustavus* and *Anderson*. Mercantile relations were feigned to disguise the real object, and an American, whose dwelling stood between the lines that separated the two armies, served as a common messenger. A few

days before the date fixed for the execution of the plot, André, having visited Arnold, was arrested by some American soldiers while returning to the British lines; and some papers were found on him which were recognized to be in Arnold's writing, and which therefore excited suspicion, although their contents did not reveal the treachery that was designed. Arnold, however, as soon as he learned the fact of André's capture, felt that he had no resource but a precipitate flight, and rushing towards the Hudson, where he had taken the precaution to have always ready a barge well-manned, he threw himself headlong into it, and caused the boatmen to make for the British sloop. The fate of André is well known, but his death, though ignominious, was happiness in comparison with the life of Arnold, who survived the war but to drag on a dishonourable life, in perpetual banishment from his native country. He died in London, June 14, 1801.

ARNOLD, Matthew, English critic, essayist, and poet, son of Dr. Thomas Arnold, was born at Laleham, near Staines, 24th December, 1822, died April 15, 1888. He was educated at Winchester, Rugby, and Balliol College, Oxford, where he gained the Newdigate prize with a poem on Cromwell, graduated with honours, and became a fellow of Oriel College. After being private secretary to Lord Landsdowne, 1847–51, he was appointed an inspector of schools, and acted as such till 1885. In connection with his functions as inspector, he was several times sent to report on the state of education in continental countries, these missions resulting in valuable reports. He also held the post of professor of poetry at Oxford. His published works include A Strayed Reveller and other Poems, 1848; Empedocles on Etna, 1853; Merope, 1858; Essays in Criticism, 1865; On the Study of Celtic Literature, 1867; Schools and Universities on the Continent, 1868; Culture and Anarchy, 1869; St. Paul and Protestantism, 1870; Literature and Dogma, 1873; volumes of Essays; &c. Matthew Arnold rendered valuable services to literature by his admirable criticisms. As a poet he belongs to the severely classic school.

ARNOLD, Dr. Samuel, an English composer, was born in London in 1740. In 1760 he was appointed a composer at the Covent Garden Theatre, and set to music the Maid of the Mill. He also produced the oratorios of the Prodigal Son, the Resurrection, and others. He was made a Doctor of Music in 1773, and in 1783 was appointed organist of the chapel royal. He prepared an edition of all the works of Handel, in thirty-six vols. folio. In 1794 he was made organist at Westminster Abbey. In 1798 he composed his oratorio of Elijah, in which Madame Mara sang. He died in 1802. Various as were his compositions, his inventive talent was but limited.

ARNOLD, Thomas, head-master of Rugby School, and professor of modern history in the University of Oxford, was born at Cowes, in the Isle of Wight, on the 13th of June, 1795, received the elements of his education at Warminster, and at the age of twelve was removed to the public school at Winchester. Here his favourite pursuits were history and poetry. Having obtained a scholarship in Corpus Christi College, Oxford, he entered that college in his sixteenth year, and though naturally of a shy disposition soon became remarked for the boldness and independence of his views, and the ability, firmness, and zeal with which he maintained them. These views embraced important subjects connected with religion, philosophy, and politics, but his whole conduct was so unsophisticated and honourable, so free from arrogance, so friendly and affectionate, that those with whom he differed most widely were often most strongly attached to him. In 1815 he was elected fellow of Oriel College, and both in that year and 1817 he obtained the chancellor's prize for Latin and English essays. His views had been early directed to the church, but some scruples as to signing the articles made him hesitate for a time. At length these scruples gave way before a more careful examination, and he took deacon's orders in 1818. In 1819 he settled at Laleham, near Staines, where he employed himself in preparing young men for the universities, and in 1820 he married a daughter of the Rev. J. Penrose, rector of Fledborough, Notts, and sister of one of his earliest school and college friends, Trevenen Penrose. About this time a remarkable change appears to have come over him; his religious views became finally settled, and his whole mind appears to have been wound up to a determination to use life diligently and earnestly for the best and holiest purposes. At Laleham he had much leisure, which he employed partly in the cultivation of general literature, and partly in writing articles on Roman history for the Encyclopædia Metropolitana, and collecting materials for an edition of Thucydides, whose writings, as well as those of Aristotle, had long been his favourites. In 1828, by the unanimous vote of the trustees, who were told on high authority that 'he would change the face of education all through the public schools of England', he was appointed head-master of Rugby School, and devoted himself to his new duties with the greatest ardour. While giving due prominence to the classics, he deprived them of their exclusiveness by introducing various other branches into his course, and he was particularly careful that the education which he furnished should be in the highest sense moral and Christian. His success was remarkable. Not only did Rugby School become crowded beyond any former precedent, but its pupils on removing to the universities carried off a very large proportion of prizes, and the superiority of Dr. Arnold's system became so generally recognized that it may be justly said to have done much for the general improvement of the public schools of England. In his position as a director of the London University he zealously endeavoured to extend the benefits of a literary and scientific education to all classes and creeds without excluding religion; but failing in his efforts to make examination in the Scriptures requisite to obtain a degree he resigned his office. He was vehemently opposed to the attempts of the Tractarians to introduce what he looked upon as a spurious Romanism into the English Church, and strenuously opposed them both from the pulpit and the press. In 1841 he was appointed professor of modern history at Oxford, and delivered his introductory course of lectures with great success. He died rather suddenly on the 12th of June, 1842. The works by which Dr. Arnold will continue to be best known are his edition of Thucydides, his Roman History, unhappily left unfinished, and his Sermons, most of them prepared for his own chapel at Rugby, and so admirably adapted to the circumstances of the youths who formed the greater part of his audience, that, though written hastily and at broken intervals snatched from other labours, they are justly held to be models in their kind. There is an admirable memoir of him by A. P. Stanley, Dean of Westminster (London, two vols. 1845).

ARNOLDISTS. See Arnold of Brescia.

ARNOLD OF BRESCIA (*Arnaldo da Brescia*), a religious and political reformer and martyr of the twelfth century. He was one of the disciples of Abelard, and on returning from Paris began to preach in his native city. His bold and lofty spirit, his knowledge of Christian antiquities, and his vehement eloquence in his public harangues, gave authority to his reproaches

against the abuses of the church. In this way he stirred up the people against the clergy; and in France, whither he was forced to flee in 1139, he also found numerous adherents, for the immorality and arrogance of the clergy excited much discontent. The fierce flame which he had kindled could not be extinguished by the excommunication pronounced against him and his adherents (Arnoldists) by Innocent II. Arnold preached his doctrines in safety at Zürich in Switzerland until about 1144, when he appeared at Rome, and by the powers of his eloquence occasioned a violent excitement among the people against the clergy. The furious multitude, whom he himself could no longer restrain, revered him as their father, and even the senate protected him till Adrian IV., in 1155, laid an interdict upon the city. This subdued the Romans, and Arnold was obliged to flee. He was taken in Campania, and burned at Rome as a heretic and a rebel; his ashes were thrown into the Tiber, and his party was suppressed. But the spirit of his teaching descended upon the sects which arose during the same and the following centuries.

ARNOTT, Dr. Neil, an eminent physician and physicist, was born at Arbroath, 5th May, 1788. His father, who latterly became a farmer on Deeside, died when Neil was young, and the mother removed to Aberdeen, where she supported her family by keeping a young ladies' school. Neil received his early education at the grammar-school of that city, and in 1801 he entered Marischal College and University to study for the medical profession. Having graduated as M.A. he went to England, and was appointed a surgeon in the East India Company's naval service. In 1811 he commenced practice in London, and was soon afterwards appointed physician to the French and Spanish embassies. About 1825 Dr. Arnott delivered in his own house a series of lectures on natural philosophy, which formed the basis of his Elements of Physics. This work appeared in 1827, went through five editions in a few years, was several times reprinted in America, and translated into different European languages. It could not be said to have reached a completed condition until 1865, when the sixth edition was published. In 1837 he was appointed physician extraordinary to the queen. Notwithstanding his numerous engagements in the exercise of his profession, he found time to issue in 1838 a treatise on Warming and Ventilation, in 1861 a work entitled a Survey of Human Progress, and another in 1870 on National Education. Besides being a popular expositor Dr. Arnott made a name for himself in the field of practical experiment, and in that of useful application of scientific theories. To this category belongs his famous stove, which obtained the Rumford medal from the Royal Society in 1854, and has been regarded as one of the most economical arrangements for burning fuel. We can only mention two other inventions, his ventilating chimney-valve and his water-bed for the protection of the sick against bed-sores. He took a deep interest in the sanitary schemes and educational movements of the country. In the latter connection it may be mentioned that he argued the claims of science as against the study of the ancient classics. He was nominated a member of the senate of London University in 1836, and it was to a great extent due to his efforts that the new scientific degrees were introduced into that institution. In 1869 he gave to each of the four Scotch universities a donation of £1000 for the promotion of the study of experimental physics among the students, and also placed £2000 at the disposal of the London University to found a scientific scholarship. He retired from medical practice eighteen years before his death, which took place at London, 2nd March, 1874.

ARNOTTO. See Annatto.

ARNPRIOR, a town of Canada, prov. Ontario, on the river Madawaska, near its confluence with the Ottawa; with some manufactures and a good trade. Pop (1901), 4152.

ARNSBERG, a town of Prussia, province of Westphalia, capital of the government of the same name, on the spur of a hill half encircled by the Ruhr, and immediately below the ruins of the castle of the counts of Arnsberg, 44 miles S.S.E. of Münster. It has three churches (one Protestant and two Roman Catholic) and a gymnasium. In the middle ages Arnsberg was one of the principal seats of the Vehmic courts (Femgerichte), which exercised a powerful sway throughout Germany. Pop. 9195. The government of Arnsberg has an area of 2972 square miles, and a population (1905) of 2,112,952. The former county of Arnsberg had an area of about 400 square miles. It became a hereditary county in the twelfth century, and in 1368 was sold by the last count to the archbishopric of Cologne.

ARNSTADT, a picturesquely situated and well-built town in Germany, in the principality of Schwarzburg-Sondershausen, 11 miles south by west of Erfurt, upon the Gera, which divides it into two parts. It has an old town-house, several churches, of which the ancient Liebfrauenkirche, lately restored, has fine painted windows and old sculptures; the residence of the prince, with valuable collections of pictures and porcelain; a gymnasium, a realschule, and a technical school, several hospitals, &c. The manufactures comprise gloves, shoes, and other articles in leather, sewing and other machines, paper, rubber goods, &c. Beer-brewing has also been long carried on here. Arnstadt is one of the most important grain and wood markets of Thuringia. In the neighbourhood are large beds of rock-salt, which in 1851 led to the establishment of brine-baths, to which have since been added various other sorts of baths. Pop. (1905), 16,270.

ARNSWALDE, an old walled town of Prussia, in the province of Brandenburg and government of Frankfort on the Oder, 39 miles south-east of Stettin, situated between three lakes, which abound in fish. It has an old Gothic church; some manufactures of iron and machinery, matches, &c. Pop. (1890), 7507; (1900), 8665.

AROBA, or Arroba.—1. A weight formerly used in Spain, Portugal, Brazil, and in all Spanish America, and still used in great part of Central and South America. In the states of Spanish origin its weight is generally equal to 25·35 lbs. avoirdupois; in Brazil it equals 32·38 lbs.—2. A measure for wine, spirits, and oil. In Spain and Mexico it is equal to 3½ imperial gallons for wine and spirits, and to 2⅞ imperial gallons for oil; in Chili, Peru, and Bolivia equal to 6·7 imperial gallons for wine.

AROK-SZALLAS, or Jasz-Arok-Szallas, a privileged market-town in Hungary, on the small stream Gyöngyös-Patak, which almost encircles the plain on which the town stands. It is on the high-road from Kaschau to Budapest, from which latter town it is 47 miles distant E.N.E. Pop. (1900), 12,067.

AROLSEN, a town of Germany, capital of the principality of Waldeck, on the river Aar. The residence of the prince was built in 1710–20. Rauch the sculptor was born here. Pop. 2620.

AROMA, a term derived directly from the Greek, and meaning *perfume*. Many plants, or parts of them, yield a more or less delightful odour, which is not always due to principles of the same nature. They often owe this odour to volatile oils called essences, which can be separated from them by suitable processes. In others the odour proceeds from a substance which cannot be seized, and to which the

name of *aroma* is more particularly applied. It appears that substances altogether, or almost altogether, inodorous may be made to diffuse a strong odour by the mixture of different substances which facilitate their volatilization. Thus, when musk is dried, ammonia is separated from it, and seems to be the vehicle of the odour, since the residuum becomes inodorous, and yet may again be made as odoriferous as it was at first by impregnating it with a quantity of the substance which had been carried off. Tobacco, in like manner, owes part of its odour to ammoniacal salts mixed with it in the process of manufacture. One singular fact is that many plants of tolerably strong odour yield an inodorous liquid when dissolved in water and yet communicate odour to the oils with which they are macerated.

AROMATICS, plants or drugs having a spicy scent, and usually a warm pungent taste. When used as medicines in considerable doses they have a powerfully exciting effect upon the mucous membrane of the mouth, stomach, and intestines, promote the flow of saliva and other secretions, and when absorbed into the blood impart a stimulus to the nervous system, increase the rapidity of the circulation, and so forth. Besides an ethereal oil they contain principally resinous and so-called extractive matters, and various acids as well as starch and other indifferent substances. They are often used as condiments partly to assist digestion and partly to increase the flavour of the food. As therapeutic agents they are used in extreme cases of indigestion, in cases of flatulence, cramp in the stomach, costiveness, &c., but only when there are no symptoms of inflammation in the stomach or intestines. They are also used in certain nervous affections, and generally where the object is to excite the system. The principal aromatics are calamus (*Acorus Calamus*), ginger, cinnamon, cassia, lavender, rosemary, laurel, nutmegs, cardamoms, pepper, pimento, cloves, vanilla, saffron. The pharmacopœia contains a large number of preparations, such as aromatic waters, powders, tinctures, ointments, &c.

AROMATIC VINEGAR, a liquid consisting of strong acetic acid, and obtained by distilling crystallized diacetate of copper. Its aroma is due to the presence of *acetone*, but it is also usually highly flavoured with preparations, such as cloves, calamus, &c. It has a pleasant perfume, and when its vapour is inhaled has a powerful effect on the nostrils, and acts as a strong excitant on the whole system. The liquid is highly corrosive.

ARPEGGIO (Italian, from *arpa*, a harp), in music, the playing of a chord on a keyed or stringed instrument by sounding the notes, not together, but in rapid succession.

ARPINO (ancient *Arpinum*), a town of Southern Italy, in the province of Caserta, 6 miles south-west of Sora, celebrated as the birth-place of Caius Marius and Cicero. It is pleasantly situated on a rising ground near the river Garigliano, was originally founded by the Volsci, and became a municipal town under the Romans. It is still a place of some importance, possesses a royal college, several churches, and manufactures woollens. Pop. (1901), 10,607.

ARQUA, a village of Northern Italy, in the province of Padua, pleasantly situated at the foot of the Euganean Hills, about 13 miles south-west of Padua. Here the poet Petrarch spent the latter years of his life, and died, 18th July, 1374. A monument of red marble has been erected over his grave in front of the church. Pop. 1200.

ARQUEBUS. See HARQUEBUSE.

ARRACACHA. See ARACACHA.

ARRACAN, or ARAKAN, a maritime division or province of Lower Burmah, now divided into the districts of Akyab, Kyouk Phyoo, Sandoway, and Northern Arracan. On the north it is separated from Chittagong by the river Nauf; on the east it has Upper Burmah and the divisions of Irrawaddy and Pegu; on the south Irrawaddy; and on the west the Bay of Bengal. Its length is about 300 miles, and its average breadth about 50; area, 14,526 square miles. Along the coast are the islands of Cheduba, Ramree, Akyab, &c. The province has the extensive range of the Yomadung Mountains extending along its eastern border, and in some parts approaching very close to the sea. Great part of Arracan is still in a state of nature, and covered with forest and jungle intersected by innumerable streams. Oak, fir, teak, and bamboo are found in the forests, and throughout the country there is abundance of tropical fruits. The chief crop is rice, for which the abundance of moisture and the high temperature render the country well adapted. Cotton, sugar-cane, hemp, tobacco, and indigo are also cultivated. The principal article of export and manufacture next to rice is salt, obtained from the tidal estuaries by evaporation. Coal, iron, and petroleum also occur in many parts. The inhabitants are a hardy, inoffensive race, athletic, intelligent, and have an independence of manner which strikingly contrasts with the obsequiousness so common among Asiatics. They are fairly civilized, and few cannot read and write. Their language is the same as that of the Burmese proper, who look on the Arracanese as the stock from which they themselves are descended. In religion they are Buddhists, and the priests employ themselves almost entirely in educating the young. Their houses are usually made of bamboo, and raised on piles about 4 feet from the ground. The chief towns are Akyab, the capital and principal port, Arracan or Mro-haung in Akyab district, the former capital, once a place of nearly 100,000 inhabitants, now with only 5000; Sandoway; and Kyouk Phyoo (Kyauk-pyu). Arracan was conquered from the Burmese in 1825, and ceded to the British the following year. The population was then estimated at 100,000, but in 1901 was 760,000.

ARRACK. See ARACK.

ARRAGON, or ARAGON, formerly the second chief division of Spain, and consisting of the kingdoms of Arragon, Valencia, and Mallorca, and the principality of Catalonia. Down to the time of the marriage of King Ferdinand the Catholic with Isabella, heiress of Castile, Arragon formed a kingdom separate from Castile, and comprised not only the four divisions above named, but also Sicily and Sardinia. After the death of Ferdinand, in 1516, it was united with Castile; but the Arragonian provinces retained their privileges, liberties, and laws. These, however, they lost almost entirely after the Spanish war of Succession, because they had attached themselves firmly to Austria; and the Bourbons, on ascending the throne, could not forgive the fidelity of the subjects of an enemy. Part of the ancient realm still preserves the title of a kingdom. It is bounded on the north by the Pyrenees, north-west by Navarre, west by Castile, south by Valencia, and east by Catalonia; length, about 190 miles; average breadth, 90 miles; area, 14,726 square miles. It forms a basin encircled by lofty mountains with wooded slopes and beautiful valleys. Several peaks of the Pyrenees rise to upwards of 11,000 feet above the level of the sea, and their tops are covered with perpetual snow. The largest level tract is the valley of the Ebro, which, entering the province on the west, flows south-east, dividing it into two nearly equal parts. The Guadalaviar and the Xucar have their sources in the extreme south, and the Arragon, an affluent of the

Ebro, in the north-west. Though in many parts bleak, and so stony as to be almost barren, it is capable, under proper culture, of raising good crops of grain, fruit, saffron, flax, and hemp. The characteristics of the inhabitants are industry, activity, national pride, and courage.

ARRAH, a town of British India, in the Lower Provinces (Bengal), in the district of Shahabad, 25 miles west from Dinapore. The surrounding country is fertile and well cultivated, and near the town is a large and beautiful lake. Arrah has been rendered famous during the mutiny of 1857 by the heroic resistance of a body of twenty civilians and fifty Sikhs, cooped up within a detached house, to a force of 3000 sepoys, who were ultimately routed and overthrown by the arrival of a small European reinforcement. Pop. in 1891, 46,905; in 1901, 46,170.

ARRAIGN, ARRAIGNMENT (in old French *arraisonner, aresner, aregner, arraigner*, from the Latin *ad rationem ponere*, to call to account). To arraign is to call the prisoner to the bar of the court to answer the matter charged upon him in the indictment. The arraignment consists in calling upon the prisoner by name, reading to him the indictment, demanding him to plead guilty or not guilty, and entering his plea. When he is brought to the bar he must be without irons or bonds of any kind, unless there be danger of an escape. Formerly he was called upon by name to hold up his hand,' by doing which he was understood to admit himself to be of the name by which he was addressed; the prisoner, however, might confess his identity by verbal admission or otherwise. After the indictment has been distinctly read over to him, the prisoner is asked if he is guilty or not guilty. He may either plead not guilty, demur to the indictment, or he may confess the fact, that is, plead guilty, in which case the court has nothing to do but award judgment; but it is generally backward in receiving and recording such a confession, and it usually advises the prisoner to retract it and plead to the indictment. If the prisoner 'shall stand mute of malice, or will not answer directly to the indictment or information, in every such case it is now lawful for the court, if it shall think fit, to order the proper officer to enter a plea of not guilty on behalf of such person, and the plea so entered shall have the same force and effect as if the person had so pleaded the same' (7 and 8 George IV. cap. xxviii. s. 2). The corresponding term in the Scotch law is *calling the diet*.

ARRAN, an island of Scotland, in the Firth of Clyde, between the coast of Ayr on the east and the Peninsula of Cantyre on the west, and separated on the north by a channel, about 5 miles across in its narrowest part, from Bute; length, north to south, 20 miles; breadth, about 10 miles; area, 165 square miles, or 105,814 acres, of which about 14,431 are under cultivation. Arran, Bute, the Cumbraes, &c., together form the county of Bute. It is of a wild and romantic appearance, particularly the northern half, which is covered by lofty granitic mountains, connected by serrated ridges, intersected by deep ravines, and separated by gloomy dells or glens, among which those of Glen Rosa and Glen Sannox are justly celebrated for the sublimity of their scenery. Here the island attains its loftiest summit in Goatfell (a corruption of the Gaelic *Goadh-Bhein*, Wind Mountain), which is 2900 feet high. The south portion is rather hilly than mountainous, and contains several arable tracts of considerable extent and tolerable fertility. The principal crops are oats and potatoes. A good many Highland cattle and sheep are fed on the island. The chief exports are cattle, sheep, and oats, together with fish, which are abundantly found in the firth. The coast is generally belted with a level tract of more or less width, and presents several indentations, of which that of Lamlash, forming a capacious and semicircular bay, completely sheltered by Holy Island stretching across its mouth, is one of the best natural harbours in the west of Scotland, and by the shelter it affords renders essential service to the commerce of the Clyde. On the small island of Pladda, about a mile from the south shore, a lighthouse has been erected. The geology of Arran has attracted much attention, as furnishing within a comparatively narrow space distinct sections of the great geological formations—the igneous in its trap and pitchstone veins, the crystalline in its towering masses of granite, the metamorphic in its mica and chlorite slate, and the series of more regularly stratified rocks in its old red sandstone, mountain limestone, coal, lias and oolite. The botany possesses almost equal interest, both in the variety and the rarity of many of its plants. A vein of sulphate of baryta, which was discovered near the entrance of Glen Sannox, was formerly worked, as well as coal. Rock-crystals of great size and beauty are often found in the granitic districts. Among objects of historical interest are the cave of Drumidoon, which Fingal is fabled to have occupied, and in which Robert Bruce is alleged, on better grounds, to have found shelter; relics of Danish forts, Druidical stones, &c. Pop. (1901), 4819.

ARRANGEMENT, in music, the adaptation of a composition to voices or instruments for which it was not originally written. Thus songs may be arranged for performance on the violin, flute, cornet, clarionet, or other solo instrument; but by far the greatest and most important arrangements are those of orchestral scores, such as overtures, symphonies, and even whole operas, transcribed for the piano, which has been called the orchestra of the drawing-room. The most of such arrangements are felt by sound musicians to be very unsatisfactory, not only because the piano cannot reproduce the peculiar effects of each separate instrument, but because they are often treated by the arranger as mere hireling's work. Four-handed arrangements for the piano are far more successful in bringing out the effects of orchestral music. It need hardly be said that the organ, owing to its great number of stops, and the power it has of sustaining each separate note, is a far better substitute for an orchestra than a piano, unless in the lightest styles of music.

ARRAN ISLANDS, or SOUTH ARRAN ISLANDS, three islands near the western coast of Ireland, in the Atlantic, at the mouth of Galway Bay. The largest, Arranmore or Inishmore, comprises 7635 acres, and has a pop. of 2592; the next, Inishmaan, 2252 acres, has a pop. of 473; and the least, Inishere, 1400 acres, has a pop. of 456. The three islands continue in a more primitive state than any part of Britain. In Inishmore are so called Druidical remains, open temples, altars, stone pillars, sacred mounts and raths, miraculous fountains, and sacred groves. The Irish language is spoken. The surface of Inishmore rises to the height of 360 feet above the sea, and is undulating and fertile. Agriculture and fishing are the chief employments. Good oats are raised, sheep fed, and the most esteemed calves are reared here. The varieties of fish are very great; and the board for the fisheries have erected a pier 245 feet in length at Killeany, on Inishmore, where 100 vessels of forty tons burden may ride safely. Some of the fishermen still use the primitive coracle, a small skiff made of osiers and covered with tarred canvas. Costume here also is original; the boots called *poppootics*, made of untanned leather, are probably the most curious.

ARRAS, a town of France, capital of the department of Pas-de-Calais, in the middle of an extensive

and fertile plain, on the Scarpe, which here becomes navigable. It is a well-built town, and has several handsome squares and a citadel, but is no longer fortified. The chief public buildings are the cathedral, a large modern Gothic edifice, not of much external beauty, but with a fine choir; the extensive buildings of the former abbey of St. Vaast, now accommodating a museum and the public library of 50,000 vols.; the Hôtel de Ville, one of the handsomest in the north of France, with a fine Gothic façade; the theatre, Hôtel de la Prefecture, barracks, &c. Its industries are various. In the middle ages it was famous for the manufacture of tapestry, to which the English applied the name of the town itself. The corn-market of Arras is the most important in the north of France. It was the birthplace of Robespierre. Pop. (1906), 24,657.

ARREST is the apprehending or restraining of one's person, which, in civil cases, can take place legally only by process in execution of the command of some court or officers of justice; but in criminal cases any man may arrest without warrant, and every person is liable to arrest without distinction, but no man is to be arrested unless charged with such a crime as will at least justify holding him to bail when taken. Warrants for arrest are generally issued on application to a justice of the peace; they should set forth the time and place of making, and the cause for which they are issued; and should be directed to the constable or other peace officer, requiring him to bring the accused party either before any justice of the county, or only before the justice who grants the warrant. A general warrant to apprehend *all* persons suspected without naming any person in particular is illegal; so also is a warrant to apprehend all persons guilty of a crime therein specified. A warrant from justices of the Court of King's Bench extends over all the kingdom, but a warrant of a justice in one county must be endorsed by a justice of another before it can be executed there. So a warrant to apprehend an offender escaped from England into Ireland or Scotland must be endorsed by the magistrate of the district in which he is found. Any private person who is present when a felony is committed is bound by law to arrest the felon, on pain of fine and imprisonment if he escape by the negligence of the stander-by. An arrest by warrant may be made on any day, or at any hour of the day or night, for treason, felony, or breach of the peace. Some persons are privileged from arrest in civil cases —ambassadors and their domestic servants, officers of courts of justice, witnesses, and all other persons necessarily attending any court of record upon business, members of the legislature, and, in England, peers, bishops, members of the royal family, and the ordinary servants of the sovereign likewise. In Scots law *apprehension* is the corresponding term.

ARRESTMENT, in Scots law, a process by which a creditor may secure payment of his debt by attaching, in the hands of a third party, any sum of money, or other property which such party may be owing to his debtor. It proceeds in virtue of a warrant, contained either in a decree of a judge, or in letters of horning issuing upon the registration of a bill, or other written obligation. This process has not, however, the effect of transferring the debtor's property to his creditor, but simply of securing it in the hands of the third party, who can neither pay it of his own accord to, nor be summoned for payment of it by the debtor, till the arrestment be loosed. To enable the creditor to recover his debt from the arrestee, he must bring an action of *furthcoming* against him, in which his own debtor requires also to be called. The English term is *attachment of debts*.

ARRESTMENT OF WAGES. See WAGES.

ARRIAN, a Greek historian, native of Nicomedia, in Bithynia, flourished in the second century after Christ under the Emperors Hadrian and the Antonines. He was a disciple of Epictètus, whose lectures he edited. While residing in Greece he gained the friendship of the Emperor Hadrian, who bestowed upon him the citizenship of Rome (A.D. 124), and subsequently appointed him prefect of Cappadocia. In this capacity he distinguished himself in the war against the Massagetæ. He was afterwards advanced to the senatorial and even consular dignities. He latterly returned to his native town, where he died at an advanced age. Like Xenophon, whom he imitated in style, he united the literary with the military character. His writings were numerous, but many of them have perished. His Anabasis of Alexander the Great, still extant, narrates the Asiatic expedition of Alexander, and being based on the memoirs of Ptolemy Lagus and Aristobulus, who both served under that king, is deemed proportionably valuable. To this work is added a book on the affairs of India, which pursues the history of Alexander, but is not deemed of equal authority with the former. An epistle from Arrian to Hadrian is also extant, entitled Periplus Ponti Euxini (Periplus of the Euxine or Black Sea). There are besides, under the name of Arrian, a Treatise on Tactics; and a Periplus of the Sea of Azof and of the Red Sea, of which the authority is doubtful. We possess also his Enchiridion, a moral treatise containing an abstract of the practical philosophy of Epictetus. There have been various editions of the Enchiridion and the Anabasis. There is a valuable modern translation of the Anabasis by Dr. E. J. Chinnock.

ARROBA. See AROBA.

ARRONDISSEMENT, in France, the subdivision of a department, or of the quarters of some of the larger cities, as Paris. The arrondissement is under the government of a *sous-préfet*.

ARROW. See ARCHERY, BOW.

ARROWHEAD (*Sagittaria*), a genus of plants belonging to the natural order Alismaceæ, distinguished by its unisexual, monœcious flowers, with a three-leaved calyx and three coloured petals. The female flowers have numerous carpels collected into a head. They are aquatic plants, and are found in all parts of the world within the torrid and temperate zones. The common arrowhead (*S. sagittifolia*), the only native species in Britain, is known by its arrow-shaped leaves with lanceolate straight lobes; it is one of the plants which have been undeservedly recommended in hydrophobia. The Chinese arrowhead (*S. Sinensis*) is cultivated in China and Japan for the sake of its edible, starchy, but somewhat acrid solid bulbs (corms). Various Brazilian species are very astringent, and their expressed juice is even employed in the preparation of ink.

ARROW-ROOT, a kind of starch manufactured from the roots or root-stocks (rhizomes), of a plant, the *Maranta arundinacea* (order Marantaceæ), a native of South America, which is cultivated in gardens both in the East and West Indies. Arrow-root is so called from its being used by the Indians as an antidote to the poison of their arrows. It is about 2 feet in height; has broad, pointed, and somewhat hairy leaves; bears small white flowers in clusters, and globular fruit of the size of currants. The starch or powder of the arrow-root is roughly obtained by the following process:—The roots are dug when a year old, and well washed, carefully peeled, and beaten in deep wooden mortars till they are reduced to a milky pulp. This is well washed again in clear water, and the fibrous parts which are found among it are carefully separated, and thrown away. It is

next passed through a sieve or coarse cloth, and suffered to stand for some time, till the starch has settled to the bottom. The water is then drawn off, and the white residue is again washed; after which the water is entirely drained off, and the pulp, when dried in the sun, is found to be an extremely pure starch, which, when reduced to powder, is the arrow-root of commerce. On a large scale arrow-root is now manufactured with the aid of specially constructed machinery. As an article of diet for children and invalids it is invaluable, more especially in all forms of bowel complaints; but it is deficient in nutritive properties, and should be combined with milk. Owing to the great demand for it it has been much adulterated, and care is required in the selection of it The purest is the Jamaica or Bermuda arrow-root; but the Bermudans have of late years almost abandoned its cultivation for the sake of more profitable crops. Arrow-root is obtained also from the root-stocks of a number of other plants. Several species of *Canna* produce tous-les-mois or Tulema arrow-root; East India arrow-root is obtained from *Curcuma angustifolia;* Brazilian arrow-root from the cassava plant (*Jatropha Manihot*); and Otaheite arrow-root from the pia plant (*Tacca pinnatifida*). A very cheap and tolerable substitute for this article may be found in the starch obtained from the potato. See POTATO.

ARROYO, the name of two towns of Spain, in Estremadura. The one, called Arroyo del Puerco (pop. in 1887, 6074), about 10 miles west of Caceres, is well built, generally in houses of two stories, and has a palace of the old dukes of Benevente, and a parish church adorned with some paintings by Morales. The other, called Arroyo Molinos de Montanches, about 27 miles south-east of Caceres, only deserves notice from its site on the edge of the ridge of Montanches, where, on October 28, 1811, the French were surprised and defeated by the British, under Lord Hill. Pop. 1805.

ARRU (or AROO) ISLANDS, a group belonging to the Dutch, situated to the south of western New Guinea, and extending from north to south about 127 miles. They consist of one large island and a number of smaller, the large island being itself divided into separate portions by a number of creeks or narrow channels. They are all low and swampy, but well wooded and tolerably fertile. The natives belong to the Papuan race, with an intermixture of foreign blood. They are dark-brown in colour, and have black frizzled hair. They wear scanty clothing (except those who are either Christians or Mohammedans), practise polygamy to some extent, purchase their wives, and are a lazy, talkative people. Many of them have been converted to Christianity by Dutch missionaries from Amboyna, others profess the Mohammedan faith, but the greater portion are kept in wretchedness by an excessive use of spirits and opium, furnished by traders from Java and Macassar. The chief exports are trepang, tortoise-shell, pearls, mother-of-pearl, and edible birds'-nests, which they exchange for European goods. Agriculture is in a primitive state, but maize, sugar-cane, beans, bananas, &c., are cultivated. Sago is the chief diet, little animal food being eaten. Pop. of group about 22,000.

ARSACES, the founder of a dynasty of Parthian kings, who, taking their name from him, are called Arsacidæ. See PARTHIA.

ARSAMAS, a considerable manufacturing town in the Russian government of Nijni-Novgorod, capital of a district of the same name, and situated on the right bank of the Tiesha, 250 miles east of Moscow. The town contains thirty-four churches, several convents and schools, nineteen tanneries, several soap-works, linen factories, &c., and has a considerable trade. Pop. (1897), 10,591.

ARSENAL, a royal or public magazine, or place appointed for the making, repairing, keeping, and issuing of ordnance and other appliances required in warfare, whether in the army or navy. Sometimes the name is applied to an establishment where such articles are kept in store only, but the chief arsenals also embrace large factories or workshops. For strategical reasons a first-class arsenal should be situated at the base of operations and supply, not too near the frontier, and in such a position as to draw in rapidly the resources of the country; it should be defended by a chain of detached forts, with a sufficiently strong *enceinte.* The Royal Arsenal, Woolwich, which manufactures warlike implements and stores for the army and navy, was formed about 1720 on the site of a rabbit warren. This establishment, which originally covered only some 40 acres, now covers over 330, and employs altogether about 10,000 people, the annual pay of whom, according to the army estimates, amounts to somewhere about £1,000,000. Guns of all sizes, carriages, shot, shell, bullets, cartridges, torpedoes, rockets, fuses, &c., are made here, and great quantities kept in store. The 80-ton guns first made for the British service were built here, and received the jocular name of 'Woolwich infants.' All the ordnance for the British service is not made here, however, many of the guns being made by Armstrong, Mitchell, and Co., or by similar firms, although the designs for these may be prepared at Woolwich. The numerous changes and improvements that have been introduced in the artillery of modern times have naturally led to equally great changes in the operations carried on, and the appliances required in this as in other arsenals. The Royal Arsenal embraces three great departments: 1. The Royal Gun Factories, for the manufacture of ordnance, provided with forges and heavy steam-hammers, rolling-mills, coiling-mills, boring-mills, &c.—2. The Royal Laboratory for the manufacture of shot and shell, bullets, blank and ball cartridges, rockets of all kinds, fuses, &c.; there being besides shell and brass foundries, smiths' shops, and numerous other shops and machine-rooms.—3. The Carriage Department undertakes the manufacture of gun-carriages, platforms, artillery machines, baggage and other wagons, pontoons, &c., for the artillery, navy, and transport service, as also ambulance wagons for the sick and wounded. Supplementary to the manufacturing departments of the Royal Arsenal are the small-arms factory at Enfield, and that at Birmingham. Gunpowder and other explosives are made at Waltham Abbey. Great quantities of military and naval stores are kept at the dockyards of Chatham, Portsmouth, Plymouth, and Pembroke. In France, each territorial military district (nineteen in all, including Algeria) has its own special arsenal or its own depôt of war material. There are naval arsenals at the great government dockyards, namely Cherbourg, Brest, Lorient, Rochefort, and Toulon. The chief arsenals of Germany are situated at Spandau, Cologne, and Dantzig, that at the first-mentioned place being the great centre of the military manufactories. Besides, the great gun-factory of Krupp at Essen could turn out if called upon three to four field-batteries daily. The chief Austrian arsenal is the immense establishment at Vienna, which includes gun-factory, laboratory, small-arms and carriage factories, &c. Austria also purchases quantities of her military stores from private manufacturers. Russia has her principal arsenal at St. Petersburg, with supplementary arsenals elsewhere. In Italy, Turin is the centre of the military factories.

ARSENIC (symbol As, atomic weight 75) is an element of very common occurrence, being found in combination with nearly all of the metals in their native ores. It is of a bluish-white colour, and readily tarnishes on exposure to the air, first changing to yellow, and finally to black. In hardness it equals copper; it is extremely brittle, and very volatile, beginning to sublime before it melts. Its specific gravity is 5·76. It burns with a blue flame and a white smoke, emitting a strong smell of garlic. Metallic arsenic commonly bears the name of *black arsenic*, in contradistinction to the *white arsenic* of commerce, which is really an oxide of the metal. Arsenic is prepared from its oxide by heating this substance with carbonaceous matter, and allowing the volatile arsenic to condense in an adjoining vessel. Arsenical pyrites, a very abundant natural substance, is also advantageously used in the preparation of arsenic, in which case iron-filings and lime are added, to combine with the sulphur, and prevent its sublimation along with the arsenic. Native arsenic has been found in the veins of primitive rocks in several countries, but in small quantities, and generally alloyed by the presence of iron, silver, or gold. This metal is used in metallic combinations when a white colour is desired. With oxygen arsenic forms two compounds, both of which, from their property of combining with alkaline and earthy bases, are commonly, although inaccurately, called *acids*. Arsenious acid, or more properly arsenious oxide or arsenic trioxide (As_2O_3), the more important of the two, is the *white arsenic* of the shops. It is usually seen in white, glassy, translucent masses, in which state it is obtained by the process of sublimation. It is one of the most virulent poisons known, not only when taken into the stomach, but when applied to a wound, or even when its vapour is inspired. It is found native in small quantities, but is obtained for use from the roasting of several ores, particularly from that of cobalt, and from arsenical pyrites. The arsenious acid is condensed in long, horizontal chimneys, leading from the furnaces where these operations are conducted, and usually requires a second sublimation, with the addition of a little potash, to deprive it of any sulphur it may contain. Its manufacture has been chiefly confined to Bohemia and Hungary. Persons brought up from their youth in the works do not generally live longer than to the age of thirty or thirty-five years. Nevertheless we have good evidence to show that in Styria arsenic is regularly consumed by many people in comparatively large quantities. The arsenic-eaters begin with small doses when young, and gradually increase the quantity consumed. This practice is said to render the breathing much less fatiguing when climbing steep ascents. Besides its use in medicine, and as a ratsbane, it is much employed as a cheap and powerful flux for glass; but when too much is added it is apt to render the glass opaque, and unsafe for domestic use. Arsenic pentoxide, or, as it is generally called, arsenic acid (As_2O_5), is a white solid, produced by oxidizing the trioxide. Arsenite of potash, added to a solution of sulphate of copper, affords an apple-green precipitate, called *Scheele's green*, which, when dried and levigated, forms a beautiful but exceedingly dangerous pigment. With sulphur arsenic forms likewise two definite compounds—realgar (As_2S_2) and orpiment (As_2S_5). They are both found native in many countries, but their supply in commerce depends upon their artificial manufacture. This is done by distilling a mixture of arsenical pyrites and iron pyrites, or of white arsenic and rough brimstone. Realgar or orpiment is obtained as the proportion of sulphur employed is greater or less. These compounds afford valuable pigments to the painter. Arsenic forms with hydrogen a gaseous compound called arsenic trihydride or arseniuretted hydrogen (AsH_3). This gas is produced when hydrogen is generated in contact with a soluble salt of arsenic; it is usually prepared by pouring a small quantity of an aqueous solution of arsenious oxide into a flask in which hydrogen is being generated. Arseniuretted hydrogen is extremely poisonous, one bubble of the pure gas being fatal in its effects. When this gas is heated in contact with a limited supply of air it is decomposed, with the production of water and metallic arsenic. On this fact the most delicate test for arsenic is based.

The common arsenic, or white arsenic of the shops, is in the form of a white crystalline gritty powder, and it is in this form that it is most frequently used as a poison. Its tastelessness, cheapness, and the culpable facility with which it can be obtained have combined to make it too familiar as a means of destroying life. Among the symptoms produced by a dangerous dose of arsenic are an austere taste in the mouth, continual spitting, constriction of the pharynx and œsophagus, teeth set on edge, nausea, vomiting of brown or bloody matter, frequent fainting fits, inflammation of the lips, tongue, palate, throat, and stomach, acute pain of the latter, rendering the mildest drinks intolerable, black stools of an indescribable fœtor, insatiable thirst, burning sensation over the whole body, difficult respiration, cold sweats, prostration of strength, loss of feeling, especially in the feet and hands, delirium, convulsions, and death. All these symptoms need not be expected to be seen in one individual who has taken a large dose of arsenic; death has sometimes ensued in cases where the arsenious acid has been swallowed in large doses without the preceding symptoms being manifested. A person indeed may die suddenly of this poison, and if the body is not examined the true cause of death may not be ascertained. These symptoms may be produced by the injudicious application of powdered arsenic, of pastes and plasters formed with the poison, and even of the arsenical solution of the pharmacopœia, to scirrhous or cancerous ulcers, and in some cases the symptoms are even more severe when the poison has been applied to an external wound than when it has been thrown into the stomach itself. Authorities differ as to the quantity of arsenious acid that will form a fatal dose. According to Dr. A. Taylor 2 or 3 grains may be fatal, and Pereira remarks that the powerful effects of an eighth, a quarter, or half a grain lead us to expect that 1 grain *might* produce death, but we have no recorded case of this. Two and a half grains are known to have destroyed a young robust girl; but much larger quantities have been taken with impunity. When very large doses are administered the stomach generally relieves itself of them by vomiting.

In a case of poisoning by arsenic if vomiting has commenced it should be promoted by tickling the throat, and administering for an adult a tablespoonful in water every eight or ten minutes of any one of the undernoted substances until 12 or 16 oz. or more have been taken:—hydrated or gelatinous sesquioxide or peroxide of iron; gelatinous hydrate of magnesia; a mixture of these two substances, which is considered by some as more effective than either of them separately; hydrated persulphuret of iron, or calcined magnesia. Oils and fats generally, milk, albumen, wheat-flour, oatmeal, sugar, or syrup are all more or less effective in lessening, if not destroying, the action of arsenious acid. If vomiting has not commenced (but this is rare) it must be excited by administering 15 to 20 grains of sulphate of zinc or ipecacuanha in a tumbler of tepid water, and tickling the throat as before. If these means fail in rapidly producing

copious vomiting, the stomach-pump must be had recourse to. It is almost unnecessary to remark that the services of a medical practitioner should be procured as quickly as possible. After the more immediately fatal symptoms have been removed, the patient should adopt exclusively a mild farinaceous, mucilaginous, and milk diet, such as sago, tapioca, arrow-root, &c.

Since the beginning of the nineteenth century arsenic has been pretty extensively used for the cure and alleviation of disease. When given in suitable doses and under the direction of an intelligent practitioner, the usual effects are an increase of heat throughout the whole body, and sometimes a slight burning sensation in the throat, extending even to the stomach, a very remarkable increase of appetite, great thirst and diarrhœa, augmentation of the secretion of urine, of the perspiration, and of the saliva. Although diarrhœa is generally caused by the use of it, it is not a constant symptom, for sometimes constipation to a great extent takes place. In small doses it is a valuable remedy in intermittent fevers, chronic skin diseases, especially lepra and psoriasis, and in several nervous affections, as neuralgia, epilepsy, chorea, tetanus, &c. It has also been given in syphilis, chronic rheumatism, typhus, and several other diseases with more or less success. Cautiously administered in phthisis it frequently restores the appetite and strength, and greatly retards, and in some cases arrests, the progress of the disease. Externally it is employed in the form of powder, lotion, and ointment for the cure of cancer. Water in which white arsenic has been steeped is sometimes used as a cosmetic wash by ladies, owing to its assumed property of softening the skin. Its use, whether internal or external, is, however, attended with considerable danger in unskilled hands, and should, therefore, never be adopted but under proper advice. Arsenic is frequently administered to horses, their owners or grooms having imbibed the notion that small doses contribute to improve the condition of the skin. In solution it is often employed as a wash or dipping to destroy vermin in cattle and sheep, but its use is not free from danger, especially to the dippers. The arsenite of copper (Scheele's green) is largely used by painters as a cheap and pretty green paint; it is also used to colour paper-hangings for the walls of rooms, a practice not unaccompanied with considerable danger, especially if flock papers are used or if the room is a confined one. Arsenic has been too frequently used to give that bright green often seen in coloured confectionery, and to produce a green dye for articles of dress and artificial flowers.

ARSINOË, the name of several celebrated females of antiquity, among the most noted of whom is the daughter of Ptolemy I. of Egypt and Berenice, born about 316 B.C.; she married Lysimachus, king of Thrace, in 300 B.C. Desirous of securing the crown for her own children Arsinoë prevailed upon Lysimachus to put Agathocles, the son of his former wife, Amastris, to death. This crime proved fatal to the Thracian king; for Lysandra, the wife of the murdered prince, fled with her children to the court of Seleucus Nicator of Syria, who took up arms in her favour. In the course of the war Lysimachus was slain (281 B.C.) and his kingdom was taken possession of by the conqueror. Arsinoë now fled into Macedonia, which was soon overrun by the Syrian army. In less than a year afterwards, however, Seleucus was assassinated by Ptolemy Ceraunus, half brother of Arsinoë. This queen, who held the city of Cassandria in Macedonia, was induced, under promise of marriage, to admit Ptolemy within its walls; but no sooner had he entered than her two children were butchered before her eyes. She succeeded in making her escape to Egypt where she became the wife of Ptolemy II., Philadelphus, her own brother (279 B.C.), thus giving the precedent to these unnatural unions which afterwards became common among the Greek rulers of Egypt. She bore no children to her brother, who, however, seems to have had a strong affection for her, as he called one of the districts of Egypt by her name and employed the architect Dinochares to build a temple to her honour.

ARSIS. See RHYTHM.

ARSON, in law, the offence of wilfully and maliciously burning the house, or part of the house, building, ship, or agricultural produce of another. To set fire to a dwelling-house, any person being therein, is by the Consolidation of Penal Laws Act, 24 and 25 Vict. cap. xcvii. s. 2, a felony punishable with penal servitude for life or not less than three years, or imprisonment not exceeding two years, with or without hard labour, solitary confinement, or whipping. The same penalty is attached, under the act from s. 1–4, to the following felonious offences:—Unlawfully and maliciously setting fire to any church, chapel, or other place of divine worship, house, stable, coach-house, out-house, warehouse, office, shop, mill, malt-house, barn, storehouse, granary, hovel, shed, or fold, or to any farm building or erection used in farming land, or in carrying on any trade or manufacture, with intent to defraud or injure any person; setting fire to any station, engine-house, or other building belonging to a railway, port, dock, or harbour, or to a canal or other navigation. By s. 5 the same punishment is annexed to setting fire to any public building in any county, city, borough, or poor-law union, or any university, college, hall, inn of court, or any building intended for public use or ornament, or maintained by public subscription or contribution. Setting fire to any other building than these mentioned is felony, punishable with penal servitude for fourteen, or not less than three, years, or imprisonment not exceeding two years, with or without hard labour (s. 6). Setting fire to any material in, against, or under any building, the setting fire to which is felony, subjects to a like punishment (s. 7). A like punishment is attached to any overt act or attempt to set fire to such building or any goods therein or about (s. 8). By s. 26 whoever sets fire to any mine of coal or other mineral fuel is liable to penal servitude for life, or not less than three years, or imprisonment for not above two years, with or without hard labour or whipping. Attempting such an offence is punishable with penal servitude for fourteen or not less than three years, or imprisonment for not above two years. By s. 18 if any person set fire to or in anywise destroy any ship or vessel, whether the same be complete or in an unfinished state; or set fire to, cast away, or in anywise destroy a ship or vessel, with intent to prejudice the owner or underwriter, or to injure any goods on board the same, he is liable to a punishment of penal servitude for life or not less than three years, or imprisonment not above two years, with or without hard labour or solitary confinement.—In Scots law the corresponding term is wilful fire-raising.

ART, in its most extended sense, as distinguished from nature on the one hand and from science on the other, has been defined as every regulated operation or dexterity by which organized beings pursue ends which they know beforehand, together with the rules and the result of every such operation or dexterity. In this wide sense it embraces agriculture, medicine, cookery, &c., which are usually called the useful arts. In a narrower and purely æsthetic sense it designates what is more specifically termed the fine arts, as architecture, sculpture, painting, music, and poetry. The useful arts have their origin in positive practical needs, and restrict themselves

to satisfying them. The fine arts minister to the sentiment of taste through the medium of the beautiful in form, colour, rhythm, or harmony. The province of the fine arts begins where utility in its narrower sense ends; their end is pleasure, or pleasure before use, or pleasure and use conjointly; it is their office to humanize and refine, to purify enjoyment, and when duly appreciated to connect the perception of physical beauty with moral excellence. It is an important psychological fact that the first beginnings of art among mankind in all ages and climes have arisen from the impulse of honouring their gods by erecting altars or sanctuaries, or from their reverence of the mighty dead, and a desire to connect themselves with the past, which induce them to raise monuments to the memory of their heroes and remarkable events, or to declaim or sing the glories of the good old days. Thus are originated architecture, sculpture, music, and poetry. It is an essential characteristic of the fine arts that the pleasures they give do not pall soon, as mere sensual pleasures do; and these pleasures, too, unlike sensual pleasures, which are confined in their influence to a single individual, may be shared at the same time by many. It is, therefore, to the nobler senses, sight and hearing, that the artist appeals—the senses of taste, smell, &c., being more or less in the monopolist interest, and also being without the power of receiving protracted enjoyment without fatigue. Although it is the office of the fine arts to refine, elevate, and humanize, and although their influence has on the whole been beneficial by withdrawing men from sensual and selfish pleasures, it must be admitted, on the other hand, that an intense devotion to one art has a tendency to destroy a healthy balance of mind in the devotees, and make them negligent of the duties they owe to society, careless of moral or political corruption, so long as they can enjoy art for its own sake.

The arts were anciently divided into *liberal* arts (*artes liberales, ingenuæ, bonæ*) and *servile* arts (*artes serviles*). Under the latter were comprehended the mechanical arts, because they were practised only by slaves. The former ones were such as were thought becoming to freemen. The name *servile arts* was lost as soon as freemen began to practise them, but the name of *liberal arts* was retained and continued to be used during the middle ages. The following seven were usually called by this name: grammar, dialectics, rhetoric, music, arithmetic, geometry, and astronomy, according to the well-known verse:—

Gram. loquitur, *Dia.* verba docet, *Rhe.* verba ministrat,
Mus. canit, *Ar.* numerat, *Ge.* ponderat, *As.* colit astra.

This awkward and illogical division continues in many Catholic schools, where the different classes are arranged according to it. In our own universities the terms 'art' classes, and 'degrees in arts,' are still in common use. See Master of Arts.

ART, Schools of. See Painting, Sculpture, &c.

ARTA, a gulf, town, and river. The gulf (ancient, *Ambracius Sinus*), an arm of the Ionian Sea, between Greece and Albania, is about 20 miles long by 10 miles broad. Near its entrance the battle of Actium was fought. The town, called also Narda (the ancient *Ambracia*), about 6 miles north of the gulf, stands on the river, which is here about 200 yards wide, and begins to be navigable. It has a picturesque but unhealthy site, and carries on a considerable trade. Pop. (1896), 7582.

ARTAXERXES, the name of several Persian kings:—1. Artaxerxes, surnamed Longimanus, because his right hand was longer than his left, the second son of Xerxes, escaped from Artabanus and the other conspirators who had murdered his father and elder brother Darius, and in 465 B.C. ascended the throne. He subjected the rebellious Egyptians, terminated the war with Athens by granting freedom to the Greek cities of Asia, governed his subjects in peace, and died B.C. 425.—2. Artaxerxes, surnamed Mnemon, from his strong memory, succeeded his father Darius II. in the year 405 B.C. After having vanquished his brother Cyrus he made war on the Spartans, who had assisted his enemy, and forced them to abandon the Greek cities and islands of Asia to the Persians. He favoured the Athenians, and endeavoured to foment dissensions among the Greeks. His last days were embittered by the unnatural conduct of his son Ochus, who, to secure the crown to himself, caused the destruction of two of his brothers. On the death of Artaxerxes Mnemon, B.C. 359, Ochus ascended the throne under the name of—3. Artaxerxes Ochus, (359 to 339 B.C.) After having subjected the Phœnicians and Egyptians, and displayed great cruelty in both countries (in Egypt he had the sacred bull Apis slaughtered and served up at his table), he was poisoned by his general Bagoas, who threw his body to the cats, and had sabre-handles made of his bones.

ARTEDI, Peter, an eminent naturalist, was born on the 22d Feb. 1705, at Anund, in the province of Angermania, Sweden. Although his parents were poor, yet it appears they found means to give him a liberal education, and with this view sent him to the college of Hernosand. Intending to embrace the ecclesiastical profession he went in 1724 to Upsala; but he turned his attention to medicine from the strong bent of his mind for the study of natural history, in which science he made rapid progress, and soon rose to considerable eminence, particularly in the department of ichthyology. Confining his botanical studies to the umbelliferous plants he suggested a new mode of classification. But Artedi was much better acquainted with chemistry than botany. His attention, however, was chiefly directed to ichthyology, the classification of which he greatly reformed and new-modelled upon philosophical principles. This arrangement added greatly to his reputation as a naturalist at the time, and afterwards became popular over Europe. In 1728 his celebrated countryman Linnæus arrived in Upsala, having been appointed to deliver lectures on botany in that place, and a lasting friendship was formed between these two great men. In 1732 both left Upsala—Artedi for England, in pursuit of his favourite study; and Linnæus for Lapland, to examine its natural productions; but before parting they reciprocally bequeathed to each other their manuscripts and books upon the event of death. However, in 1735, they met again at Leyden, where Artedi was introduced to Seba, and employed in preparing for the press the third volume of that eminent naturalist's Thesaurus, which chiefly related to fishes. Artedi formed the resolution, as soon as that work was finished, to return to his native country and publish the fruits of his own labours; but as he was returning home from Seba's house in Amsterdam on the evening of the 27th September, 1735, the night being dark, he fell into a canal and was drowned. According to agreement his manuscripts came into the hands of Linnæus, and his Bibliotheca Ichthyologica and Philosophia Ichthyologica, together with a life of the author, were published at Leyden in the year 1738.

ARTEMIS. See Diana.

ARTEMISIA, Queen of Caria, sister and wife of Mausolus, to whom she erected in her capital, Halicarnassus, a monument, called the Mausoleum, which was reckoned among the seven wonders of the world. See Mausoleum. Another Artemisia, queen of Hali-

carnassus, accompanied Xerxes on his expedition against Greece, and distinguished herself in the battle of Salamis (480 B.C.) by her determined boldness.

ARTEMISIA, in botany. See WORMWOOD.

ARTERY. See BLOOD-VESSEL.

ARTESIAN WELLS, so called from the French province of Artois, where they appear to have been first used on an extensive scale, are formed by boring-rods, which penetrate the strata till they reach a supply of water having its sources higher than that of the mouth of the boring. From the natural law by which all fluids seek to maintain their level the water thus reached rises to the surface and becomes a spring, which is usually copious in proportion to the depth of the boring made. The conditions of the possibility of an artesian well are that a porous or water-carrying layer, depressed at the middle and reaching the surface of the ground at the extremities, where the water enters, should lie between two layers impermeable to water, that the porous layer be not interrupted by any impermeable wedge, that there be no escape for the water through any breach in the impermeable layers, and that the surface of the ground where the boring is made be not higher than the extremities of the porous layer. Though the theory of artesian wells is sufficiently simple, the actual construction of them is attended with many difficulties, and is seldom accomplished without incurring a very heavy expenditure. It is obvious also that, as the supply of water is necessarily limited, a quantity which might be sufficient for one well may become inadequate if more than one are sunk into it; and hence where from particular causes in any locality, as the existence of a large city or of numerous public works, large quantities of water are drawn from the same subterraneous reservoir by several orifices, a permanent diminution of the general level of the water may be produced, and the supply, instead of proving perennial, may gradually fail and ultimately altogether cease. In general, however, the supply is sufficiently copious for domestic purposes, and is sometimes so abundant that the water may be used as a moving power, and in arid regions for fertilizing the ground, to which purpose artesian springs have been applied in the desert of Sahara from a very remote period. Numerous wells have been bored for this purpose by the French in Algeria, and such wells are also common in the United States, Australia, &c. Nor is this the limit of utility. The temperature of the water increases with the depth from which it rises, and hence it has been found available for heating manufactories, greenhouses, and public buildings. The hollows in which London and Paris lie are both perforated in many places by borings of this nature. One of the most celebrated artesian wells is that of Grenelle near Paris. It had been calculated that the upper greensand situated below the chalk and tertiary beds of the Paris basin would be reached at the depth of 1200 to 1500 feet. Operations were commenced in 1834 with a boring chisel of the dimensions of 1 foot in width, reduced at the depth of 500 feet to 9 inches, of 1100 feet to 7½ inches, and at 1300 feet to 6 inches. In May, 1837, at the depth of 1254 feet, the tubing, with 90 yards of boring-rods attached to it, broke, and occasioned a delay of fifteen months in extracting the fragments from the bore. In 1840 a similar delay of several months was caused by the chisel falling off. When the calculated maximum depth of 1500 feet had been reached without the anticipated result great disappointment was felt, and the work would probably have been abandoned but for the urgent representations of Arago. On 26th February, 1841, the boring-rods, at the depth of nearly 1800 feet, suddenly descended several yards without opposition. They had reached the greensand, and on being withdrawn were followed by a violent rush of water, which rose many feet in the air. From this well a stream of water of the constant temperature of 82° Fahr. was at first discharged at the rate of about 700,000 gallons in twenty-four hours, but owing to the sinking of new wells and other causes the daily yield has greatly decreased. At first the water was charged with enormous quantities of mud and sand. The whole cost of the well did not exceed £12,000. The artesian well at Grenelle is deeper than any other previously sunk, but it has since been exceeded in depth by many others. In the Paris basin, for instance, there is another well which reaches a depth of 2360 feet and discharges water at a temperature of 94° F. In several of the United States many artesian wells have been sunk in order to obtain petroleum and natural gas, and these often exceed 1500 feet in depth. One well at Budapest is 3182 feet deep, and another at St. Louis, U.S., is 3843 feet deep, but has bad water. In Germany there are several artesian wells over 4000 feet in depth, and some bore-holes penetrate more than 5000 feet (or say a mile) into the ground. These wells are now made with larger diameters than formerly, and altogether their construction has been rendered much more easy in modern times. For the method of carrying out borings see MINING.

ARTEVELDE, or ARTEVELD—1. JACOB VAN, a brewer of Ghent, born about 1300. His great wealth, eloquence, and administrative talent gave him much influence, and he was selected by his fellow-townsmen to lead them in their struggles against Count Louis of Flanders. In 1338 he was appointed captain of the forces of Ghent, and he banished from the city all the nobles and adherents of the count. In the war which ensued shortly after between Philip of Valois, king of France, and Edward III. of England, Artevelde took part with the latter and greatly contributed to his success. At length his strong attachment to the English raised suspicion as to his intentions, and it having been ascertained that he wished to cement the English alliance by making Edward the Black Prince Count of Flanders, and that during some violent popular commotions he had introduced 500 English soldiers and lodged them within his premises, the cry of treason was raised, and in the struggle which ensued Artevelde lost his life in 1345.—2. PHILIP, son of the former, for a time lived happy in domestic retirement, but was at last induced, by the acclamations of the men of Ghent, to become their captain. At this time the town had been almost reduced to extremity by the Count of Flanders, Louis II., who was besieging it and had cut off its supplies. Artevelde took the bold step of marching out unseen at the head of a body of chosen troops and endeavouring to surprise the count in his head-quarters at Bruges, in which at the time a great festival was being held. The alarm was raised, and the count marched hastily out to the assault; but Artevelde had chosen his position skilfully; the troops of the count became entangled in a marsh, and he fled, closely pursued by the men of Ghent, who entered Bruges along with him, and pillaged it without mercy. Other towns of Flanders, struck with terror, opened their gates, and Artevelde now fired with ambition, began to assume the state of a sovereign prince. His reign proved short-lived. The Count of Flanders returned with a large French force, fully disciplined and skilfully commanded. Artevelde was rash enough to meet them in the open field at Roosebeke, between Courtray and Ghent, in 1382, and fell with 25,000 Flemings. There is a fine play by Sir Henry Taylor with Philip van Artevelde as the subject (1834, first acted, 1847). See

Hutton's James and Philip van Arteveld (1882), and Ashley's James and Philip van Artevelde (1883).

ARTHRITIS (Greek *arthron*, a joint), any inflammatory affection of the joints, but the gout particularly. See GOUT.

ARTHROPODA, the higher division of Annulosa or Articulata, including those animals which possess jointed limbs truly articulated to the body. Four classes are included in this division—the Insecta or Insects (possessing six legs, two pairs of wings, and a distinct head, chest, and abdomen); the Arachnida or Spiders, &c., with eight legs, and a united head and chest; the Crustacea, breathing by gills, and possessing more than eight legs; and the Myriapoda or Centipedes, with numerous legs, and similar body-segments. The genus *Peripatus* (which includes animals resembling caterpillars) is now usually regarded as the type of a distinct class.

ARTHUR, or ARTUS, Prince of the Silures in the sixth century, an ancient British hero, whose story has been the theme of much romantic fiction. He was, says Geoffrey of Monmouth, who probably followed the legends current in Wales, the fruit of an adulterous connection between the Princess Igerna, wife of Gorlois, duke of Cornwall, and Uthyr, pendragon or chief commander of the Britons. He was born about 501. In 516 he succeeded his father in the office of general, and performed those heroic deeds against the Saxons, Scots, and Picts which have made him so celebrated. He married the celebrated Guenevere belonging to the family of the dukes of Cornwall; established the famous order of the Round Table; and reigned, surrounded by a splendid court, twelve years in peace. After this, as the poets relate, he conquered Denmark, Norway, and France, slew the giants of Spain, and went to Rome. From thence he is said to have hastened home on account of the faithlessness of his wife, and Modred, his nephew, who carried on an adulterous intercourse, and stirred up his subjects to rebellion; to have subdued the rebels, but to have died in consequence of his wounds in 542, on the Island of Avalon, where it is pretended that his grave was found in the reign of Henry II. The story of Arthur is supposed to have some foundation in fact. It is generally believed that he was one of the last great Celtic chiefs who led his countrymen from the west to resist the settlement of the Saxons in southern Britain. But many authorities regard him as a leader of the Cymry of Cumbria and Strath-Clyde against the Anglo-Saxon invaders of the east coast and the Picts and Scots north of the Forth and the Clyde. In our own day the interest of the old legends has been revived by the works of Lytton and especially Tennyson. See the articles on ROMANCE and ROUND TABLE; also the following works:—Skene's Four Ancient Books of Wales (1868); Stuart-Glennie's Journey through Arthurian Scotland (1867), and Arthurian Localities (1869); Prof. John Rhys's Studies in the Arthurian Legend (1891); Dr. H. O. Sommer's Morte d'Arthur (3 vols., 1889–91); &c.

ARTHUR'S SEAT, a hill in the near neighbourhood of Edinburgh, said to have been so denominated from a tradition that King Arthur surveyed the country from its summit and defeated the Saxons in its neighbourhood. It is a rugged, steep, and in some places precipitous, rock, exhibiting on the south side a range of perpendicular basaltic columns, called Samson's Ribs, of pentagonal and hexagonal forms, from 50 to 60 feet in height and 5 in diameter. It affords spars, zeolites, hæmatites, jaspers, and a few agates, with abundance of trap or greenstone. The highest point is 822 feet above sea-level. From hence may be seen a wide expanse of sea, the course of the Forth, the distant Grampians, &c., and a large portion of the most populous and best cultivated part of Scotland, including the picturesque city of Edinburgh and its castle. On the north side are the ruins of a chapel and hermitage, dedicated to St. Anthony, and a fine spring called St. Anton's Well. A carriage road called the Queen's Drive goes round its base.

ARTICHOKE (*Cynara Scolymus*), a well-known plant, of the order Compositæ, cultivated in Europe chiefly for culinary purposes. The parts that are eaten are the receptacle of the flower, called the *bottom*, and a fleshy substance on the scales of the calyx. The *choke* consists of the unopened florets and the bristles that separate them from each other. These stand upon the receptacle, and must be cleared away before the bottom can be eaten. In England artichokes are generally boiled plain, and eaten with melted butter and pepper, and are considered both wholesome and nutritious. The bottoms are sometimes stewed, boiled in milk, or added to ragouts, French pies, and other highly-seasoned dishes. For winter use they may be slowly dried in an oven, and kept in paper bags in a dry place. On the Continent of Europe artichokes are frequently eaten raw with salt and pepper. By the country people of France the flowers of the artichoke are sometimes used to coagulate milk for the purpose of making cheese. The leaves and stalks contain a bitter juice, which, prepared with bismuth, imparts a permanent gold colour to wool.—The so-called *Jerusalem artichoke* is a species of sunflower (*Helianthus tuberosus*), which grows wild in parts of South America and yields roots or tubers resembling those of the potato and used as food. This plant bears single stalks, which are frequently 8 or 9 feet high, and yellow flowers, much smaller than those of the common sunflower. So extremely productive are these valuable roots that between 70 and 80 tons of them are said to have been obtained in one season from a single acre of ground. Their flavour is similar to that of the common artichoke. The name 'Jerusalem' is a corruption of the Italian *girasole*, sunflower, 'artichoke' having been added from the similarity in the flavour of the bottoms of the one plant and the tubers of the other.

ARTICLE, in grammar, a part of speech used before nouns to limit or define their application. In the English language *a* or *an* is the indefinite article (the latter form being used before a vowel sound) and *the* the definite article. The English indefinite article is really a modified form of the numeral adjective *one*; so the German *ein* and the French *un* stand for the numeral and the article. There are traces in various languages showing that the definite article was originally a pronoun; thus the English *the* is closely akin to both *this* and *that*. The Latin language has neither the definite nor the indefinite article; the Greek has the definite; the Hebrew and Arabic definite article was prefixed to its noun, while, on the other hand, in the Syriac and Chaldaic it was affixed to the noun, as it is in the Icelandic.

ARTICLES, THE SIX, in English church history, were articles of faith imposed by the act 31 Henry VIII. cap. xiv., passed by Parliament in 1539, and known as the Six-stringed Whip or Bloody Statute, from the merciless persecutions to which it gave rise. The Six Articles are supposed to have been the composition of the king himself, and they had no formal authority from the church. They enforced belief in transubstantiation, declared that communion in both kinds was unnecessary, that the marriage of priests was unlawful, that vows of chastity or widowhood were absolutely binding, and that private masses and auricular confession were expedient and necessary.

The severity of the act was soon mitigated, and it was finally repealed by 1 Edward VI. cap. xii.

ARTICLES, THE THIRTY-NINE, of the Church of England, a body of divinity, chiefly founded on the formulary of Forty-two Articles compiled by Archbishop Cranmer in 1551, in obedience to the command of the king (Edward VI.) and privy-council, who instructed the archbishop to 'frame a book of articles of religion, for the preserving and maintaining peace and unity of doctrine in this church, that, being finished, they might be set forth by public authority'. Several of these articles (the first, second, twenty-fifth, and thirty-first) were drawn directly from the Augsburg Confession, and the ninth and sixteenth are traceable to the same source. During the reign of Mary the Articles were suppressed, but the accession of Elizabeth offered an opportunity of drawing up a fresh formulary. In 1562–63 a convocation was held, in the course of whose sittings King Edward's Articles were carefully considered and revised. As the result of this revision (mainly the work of Archbishop Parker, assisted by Bishops Grindal, Horn, and Fox), four of the original forty-two articles were omitted, namely, the tenth, sixteenth, nineteenth, and forty-first, and articles fifth, twelfth, twenty-ninth, and thirtieth were newly introduced; seventeen other articles were more or less modified. On a further revision articles thirty-ninth, fortieth, and forty-second were struck out, and some slight changes made in several others. These thirty-nine articles were drawn up and ratified in Latin, but when they were printed both in Latin and English the twenty-ninth was omitted and the first clause of the twentieth struck out. The thirty-ninth was, however, restored on a final revision by Parker in 1571, and then imposed on the clergy for subscription. They were ratified anew in 1604 and 1628. All candidates for ordination must subscribe these articles. Subscription is no longer necessary on matriculating or taking a degree at Oxford or Cambridge. This formulary is now accepted by the Episcopalian Churches of Scotland, Ireland, and America. For a brief analysis of the Thirty-nine Articles see ENGLAND—Church.

ARTICLES OF WAR, a code of laws for the regulation of the military forces of Great Britain and Ireland, issued prior to 1879, in pursuance of the annually renewed Mutiny Act. The crown with regard to military offences had considerable legislative power; for the sovereign by the annually renewed Mutiny Act could form articles of war and constitute courts-martial to try crimes by such articles, and inflict penalties by judgment of the same, not inconsistent with the provisions of the Mutiny Act, or extending to transportation or to life or limb, except for crimes expressly declared to be so punishable by the act. In 1879 the Army Discipline Act consolidated the provisions of the Mutiny Act with the Articles of War. This act was amended in 1881, and now the complete Military Code is contained in the Army Act of 1881. The discipline of the navy used to be regulated by certain rules, &c., first enacted shortly after the Restoration, but it is now regulated by the Naval Discipline Act of 1861.

ARTICULATA, a term invented by Cuvier, and employed to designate one of the great types of structure or sub-kingdoms of the animal world, now mainly included in the Arthropoda.

ARTICULATION, in anatomy, the joining together or fitting of bones one into another, is divided into the three classes of movable, immovable, and mixed, or where Greek terms of the same meaning are used, into *diarthrosis*, *synarthrosis*, and *amphiarthrosis*. In no part of the human frame is design, especially of the kind called mechanical contrivance, more beautifully manifested than in its articulations, the means employed being always in admirable accordance with the purposes intended. When the bones are to constitute immovable cavities we see them dovetailed and immovably rivetted together, as in the skull; when in a cavity a certain degree of motion is requisite, the bony surfaces are joined by the interposition of elastic cartilages, as in the breast and the vertebral column; and when the power of motion becomes the essential condition the bones terminate in rounded heads which roll in corresponding cavities, as in the shoulder; or become furrowed pulleys, as in the elbow; or are smoothed down into almost plane surfaces, as in the wrist. In the movable articulations perfect freedom of action is secured not only by the cartilages but by an unctuous liquid, which is secreted by what is called a *synovial* membrane, and is constantly employed in lubricating or oiling the joints. The articulations, however, notwithstanding the admirable provisions made for them, are subject to various diseases or injuries, among which may be mentioned *entorsis*, or distension of the ligaments; *diastasis*, or loosening of the articulation; *luxation*, or displacement of the articulated parts; acute *arthritis*, or articular rheumatism, often accompanied with *endocarditis*, or inflammation of the heart and its membranes; chronic *arthritis*, sometimes followed by *white swelling* and *ankylosis*, *caries*, and *necrosis* of the articulated surface, &c.

ARTILLERY (derived from Latin, *ars*, *artis*, art, through the French) signifies all sorts of great guns or cannon, mortars, howitzers, petards, &c., together with all the apparatus and stores thereto belonging, which are taken into the field, or used for besieging and defending fortified places. The same name is also given to the troops by whom these arms are served, the men being, in fact, subsidiary to the instruments. All artillery may be classed into land and marine artillery; the former being again divided into field artillery, siege artillery, fortress or garrison artillery, coast artillery, mountain artillery. Field artillery is intended to accompany armies in the field, where it is employed to co-operate with the infantry and cavalry, preparing the way for these being brought into action, supporting their attack, covering their retreat, &c. For this purpose field artillery must be able to follow the other two branches of the service in the field, and must even be capable of moving with some rapidity, and that often over difficult ground. Hence great attention requires to be paid to lightness and strength in the construction of the guns and carriages, and very heavy guns are obviously altogether unsuitable for being used as field artillery. Field artillery is often divided into horse artillery and foot artillery. The former, being intended to act with cavalry, is lighter than the latter, and the men are mounted on horseback or on the gun-carriages; the latter acts with the infantry, and the gunners march on foot. A subdivision of the artillery again is into batteries, furnished each with from four to six guns. Attached to the batteries are farriers, carriage smiths, shoeing smiths, wheelers, collar-makers; besides a large quantity of ammunition, with stores, and tools of various kinds. The whole artillery force of the British army together forms one immense regiment, called the Royal Regiment of Artillery, first organized in 1716. Though called a regiment it is divided into the branches known as horse artillery, field artillery, mountain artillery, and garrison artillery. In 1904 a new 18½-pounder quick-firing gun for the field artillery and a 12½-pounder for the horse artillery were adopted. The Royal Artillery comprises over 50,000 men. In the continental armies the artillery is divided into regiments. Since the Franco-Ger-

man war military authorities generally concur in the opinion that a well-appointed field-force should have three guns to every 1000 infantry. Siege artillery is used in the attack of fortified places, and is naturally heavier than the field artillery; indeed, in regular sieges the heaviest guns that can be transported are often required. Garrison artillery, not requiring to be moved from place to place, is also of heavy calibre, as is likewise the coast artillery, with which shore-batteries are armed, and which has now to contend with armour-plated vessels. Marine guns are at the present day the heaviest of all. The term *Park of Artillery* is given to the entire train of artillery, with the apparatus, ammunition, &c., as well as the battalion appointed for its service and defence. See also CANNON, GUN, GUNNERY, &c.

ARTILLERY COMPANY, THE HONOURABLE, the oldest existing body of volunteers in Great Britain, was instituted in 1585, but shortly afterwards broke up. It was, however, revived in 1610, and held its meetings for military exercise at the Artillery Ground, Finsbury, where the London archers had met since 1498. In the civil war (1642–48) the Company espoused the cause of the Parliament, and greatly contributed towards its success. In June, 1780, during the Lord George Gordon riots, it successfully defended the Bank of England against two attacks by the rioters. Previous to 1842 the Company elected their own officers, but since that date they have been appointed by the crown.

ARTILLERY SCHOOLS, institutions established for the purpose of giving a special training to the officers, and in some cases the men, belonging to the artillery service. In Great Britain the artillery schools are at Woolwich and Shoeburyness. The Department of Artillery studies at Woolwich gives artillery officers the means of continuing their studies after they have completed the usual course at the Royal Military College, and of qualifying for appointments requiring exceptional scientific attainments. Its duties include the instruction of an advanced class of officers, selected by competition, to qualify for scientific appointments. The School of Gunnery at Shoeburyness gives instruction in gunnery to officers and men, and conducts experiments connected with artillery. The sands at the mouth of the Thames afford ample opportunity for artillery practice and firing at long ranges. Officers and non-commissioned officers are selected to go through a long course of instruction in gunnery, use of military machines, &c., and qualify for instructors to brigades and batteries; and squads of officers and men are sent there for instruction.

The Prussian artillery school is at Berlin. This institution is also attended by officers from the other German states, and from the smaller foreign states which have no artillery schools of their own, such as Switzerland, Roumania, Servia, &c. The French artillery school is at Rouen. The artillery schools of Russia and Austria are at St. Petersburg and Vienna respectively.

ARTIODACTYLA. See UNGULATA.

ARTISANS' AND LABOURERS' DWELLINGS ACT, an English act of Parliament passed in 1868, to enable town-councils and other local authorities to demolish or improve dwellings unfit for human habitation, and to build and maintain better dwellings in lieu thereof. Other acts relating to the same object were subsequently passed.

ARTOCARPACEÆ, a natural order of plants closely allied to Urticaceæ (the nettles), so closely, indeed, that many botanists consider them a suborder of Urticaceæ. They are distinguished by having flowers with a very imperfectly formed calyx, no corolla, leaves alternate, simple, often lobed, with large deciduous stipules, a rough foliage, and an abundance of milky juice which frequently contains caoutchouc; the flowers are collected into dense round heads, and the ovules are suspended singly from the upper part of the solitary cavity of the ovarium. The tropics of both hemispheres are the natural habitats of these plants. The typical and most important plant of this order is the bread-fruit (*Artocarpus incisa*), the edible quality of which is owing to the presence of a large quantity of starch in its succulent heads. (See BREAD-FRUIT.) The fruit of the jack or jaca (*A. integrifolia*) attains a larger size, sometimes weighing 30 lbs., but is inferior in quality. The acrid milk of the upas (*Antiaris toxicaria*) of Java owes its poisonous properties to the presence of strychnia. (See UPAS-TREE.) On the other hand, the milk of the cow-tree or Palo de Vacca (*Galactodendron utile*) is as rich and wholesome as that of the cow. (See COW-TREES.) *Brosimum Alecastrum* yields bread-nuts, which when boiled or roasted are nutritious and agreeable articles of food. The wood of *Piratinera Guianensis*, called snakewood or letter-wood in Demerara, is a fine ornamental wood used for articles of furniture; and the fibrous bark of *Antiaris saccidora* is used for making sacks.

ARTOIS, a former province of France, anciently one of the seventeen provinces of the Netherlands. It was bounded on the south and west by Picardy, on the east by Hainault, and on the north by Flanders. Artois always was accounted very productive. It is now almost completely included in the department of Pas de Calais.

ART-UNIONS, a name given to societies formed for the encouragement of the fine arts by the purchase of works of art out of a common fund raised in small subscriptions or shares, and their distribution by lot. The first art-union was started in France; but the Munich Art-union was the first that showed the important results that might be attained by societies of this kind. Berlin and other towns of Germany soon followed the example of Munich; and the movement at last passed to Britain, where the first art-union was founded in Edinburgh in 1834. The Edinburgh society soon proved a complete success. 'A large annual fund, exclusively devoted to the purchase of paintings and sculpture and to the dissemination of engravings, was speedily realized, which in the course of nine years amounted to not less than £36,900. During the same period 771 paintings, 40 pieces of sculpture, and about 30,000 impressions from engraved plates were distributed among the members of the association.' This prosperity has continued up to the present time. The Art-union of London soon followed that of Edinburgh, and other societies of the same kind have been formed throughout the country and in Ireland. The general principle on which these societies is conducted is that each member, in return for a certain annual subscription, receives a ticket which entitles him to a chance in the lottery in which the works of art purchased by the subscriptions of the members are the prizes; while in case of drawing a blank he generally receives a valuable engraving. Art-unions, being of the nature of lotteries, come under the provisions of a special act of Parliament.

ARTVIN, a Russian town, in the Caucasus, about 35 miles inland from Batoum. Pop. 7850.

ARUBA, an island off the north coast of Venezuela, belonging to Holland, about 30 miles long and 7 broad. The surface is generally rocky, quartz being abundant, and containing considerable quantities of gold. A phosphate which is exported for manure is also abundant. The climate is healthy. Pop. 4500.

ARUM, a genus of plants belonging to the natural order of Araceæ or aroids. The most remarkable species is the *A. maculatum*, which forms underground a roundish corm. From this a few long-stalked, dark-green, arrow-headed leaves, usually spotted with black, spring up, inclosing a stem, which terminates in a long green sheath or spathe, containing the parts of fructification. Both the leaves and corms are acrid; but the latter, when ripe, contain starch, which may be extracted and used as food. In places where it abounds it has long been converted into a kind of arrow-root, and forms the Portland sago of Dorsetshire. It has been proposed as a substitute for the potato, but the corms are too small for profitable culture. The Swiss use them as a substitute for soap, and the whole plant figures in old herbals as possessed of various medicinal properties.

ARUNDEL, a borough and market-town in the county of Sussex, England, situated on the declivity of a hill, on the north bank of the river Arun, about 4 miles from its mouth, and 19 miles west of Brighton. The river is navigable to the town for vessels of 250 tons; the larger vessels stay at Littlehampton, at the mouth of the Arun. Its principal edifices are a handsome parish church, with a square tower and a chancel (the Fitz-Alan chapel) separated from it by a wall; a beautiful Roman Catholic church; and the celebrated castle of Arundel (with an ancient Norman keep), the chief residence of the dukes of Norfolk, standing on a knoll, partly formed by nature and partly by art, on the north-east side of the town. Pop. in 1881, 2748; in 1891, 2644; in 1901, 2738.

ARUNDELIAN MARBLES, a series of ancient sculptured marbles discovered by William Petty, who explored the ruins of Greece at the expense of and for Thomas Howard, earl of Arundel, who lived in the time of James I. and Charles I., and devoted a large portion of his fortune to the collection of monuments illustrative of the arts, and of the history of Greece and Rome. These marbles, named in honour of their purchaser, arrived in England in the year 1627, with many statues, busts, sarcophagi, &c. John Selden published some of the inscriptions which he thought most interesting, under the title of Marmora Arundeliana (4to, London, 1628). It is supposed that not more than half of the original number escaped destruction in the civil wars: they were then in the garden of the earl, in the Strand, in London. Henry Howard, duke of Norfolk, grandson of the collector, presented the remainder to the University of Oxford, where they still remain. The whole collection of inscriptions was published by Humphrey Prideaux in 1676; by Michael Maittaire in 1732; by Dr. Chandler, very splendidly, in 1763. These inscriptions are records of treaties, public contracts, thanks of the state to patriotic individuals, &c., and many of a private nature. The most curious and interesting is one usually known by the name of the Parian Chronicle, from having been kept in the island of Paros. It is a chronological account of the principal events in Grecian, and particularly in Athenian history, during a period of 1318 years, from the reign of Cecrops (B.C. 1450) to the archonship of Diognetus (B.C. 264). The authenticity of this chronicle has been called in question, but has been vindicated by many of the most learned men.

ARUNDO, a genus of grasses belonging to the division which has several florets in each spikelet, surrounded by silky hairs. See REED.

ARUSPICES, or HARUSPICES, Roman priests and prophets, who foretold events from observing the entrails of sacrificed animals. They observed, too, all the circumstances which accompanied or happened during the sacrifice; for example, the flame, the mode in which the animal behaved, the smoke. Their origin is to be sought for in Etruria. They were introduced into Rome by Romulus, where they enjoyed their authority till the time of the Emperor Constantine (337 A.D.), who prohibited all soothsaying on pain of death.

ARYAN, or INDO-EUROPEAN FAMILY OF LANGUAGES. See INDO-EUROPEAN FAMILY.

AS, a word used by the Romans in three different ways, namely, to denote, 1, any unit whatever, considered as divisible; 2, the unit of weight, or the pound (*libra*); 3, their most ancient coin. In the first use of the word the pound, foot, *jugerum*, *sextarius*, were called *as* when contradistinguished from their divisions or fractions. In fact, the word was applied to any integer; for example, inheritances, interest, houses, funds, &c. The *as*, whatever unit it represented, was divided into twelve parts, or *ounces* (*unciæ*). Scholars are not agreed on the weight of a Roman pound, but it was not far from 237·5 grains avoirdupois, or 327·1873 grammes, French measure. In the most ancient times of Rome the copper coin which was called *as* actually weighed an *as*, or a pound, but in 264 B.C. it was reduced to 2 oz., in 217 to 1 oz., and in 191 to ½ oz. In 269 B.C., when silver money was first struck by the Romans, the *as* was superseded as a money of account by the sestertius coined from the more precious metal.

ASA, great grandson of Solomon and third king of Judah; he ascended the throne at an early age, and distinguished himself by his zeal in supporting the worship of God, and rooting out idolatry with its attendant immoralities. During the first ten years of his reign his kingdom enjoyed peace and prosperity, and the population had so increased that the king could count on the service of 580,000 tried soldiers. In the eleventh year of his reign, however, he was attacked by the Ethiopian King Zerah at the head of a million of men. The two armies joined issue in the valley of Zephathah, and the Ethiopians were completely routed, leaving much spoil in the hands of the victors. On his triumphant return Asa was met by the prophet Azariah, who encouraged him to persevere in the extirpation of idolatry. The heathen queen-mother was removed from authority, her idol burned, and the altars and groves of the strange gods throughout the kingdom were destroyed. In the thirty-sixth year of Asa's reign Baasha, king of Israel, occupied Ramah, and proceeded to fortify it as a frontier barrier. Asa called in the aid of Benhadad, king of Syria, and recovered the city, but he incurred the rebuke of the prophet Hanani for seeking help elsewhere than from the Lord. The incensed king threw the prophet into prison, and in his rage oppressed some of the people. For the last three years of his life he was afflicted with disease in his feet, and it is mentioned to his reproach that he placed too much confidence in his physicians. He died after a prosperous reign of forty-one years, and was honoured with a funeral of unusual cost and magnificence.

ASAFŒTIDA is a resinous gum procured from the root of a large umbelliferous plant (*Ferula Asafœtida*) which grows in some parts of Persia and adjacent regions. The leaves of this plant are nearly 2 ft. long, doubly-pinnate, and have the leaflets alternate; the flowers are small. No one who has ever smelled the peculiarly powerful and garlic-like odour of asafœtida can well forget it. If exposed to the air, but particularly when heated, it will pervade every apartment of a house. Notwithstanding this, it constitutes a favourite seasoning for food with the inhabitants of many parts of the East. It is sometimes used by our own cooks, but in very minute quantity, in place of garlic. In many parts of Arabia and Persia asafœtida is much esteemed as a remedy for various internal diseases, and even as an external

application to wounds. It has been applied with success medicinally in the cure of hysteria, hooping-cough, and worms; and in flatulent colics it has in many cases afforded great relief. It is imported in masses of various sizes and forms, and of yellow, brown, or bluish colour, sometimes interspersed with roundish white pieces. The part of the plant from which the drug is obtained is the root, in which, after it is four years old, incisions are made. The upper part of the roots, which are sometimes as thick as a man's leg, rises above the surface of the ground. When cut, the asafœtida exudes as a thick white juice, like cream, which, from exposure to the air, becomes at last of a dark-brown colour. The fresh juice has an excessively strong smell; a single dram of it smells more than 100 lbs. of the dry asafœtida brought to us.

ASAGRÆA. See SABADILLA.

ASAPH, ST., or LLANELWY, a city of Wales, in the north-west of Flintshire, situated on the slope of a pleasant eminence between the rivers Clwyd and Elwy, which renders its first appearance striking, although it consists of little more than a single street. The houses are of brick, substantially and well built. The see is supposed to have originated under St. Kentigern or St. Mungo, bishop of Glasgow, an exile from Scotland, who, returning to his own country, was succeeded by his disciple St. Asaph, from whom both the diocese and town took its name. The cathedral, built chiefly about the close of the fifteenth century, was recently restored under Sir G. G. Scott. Its most striking feature externally is a massive central tower. There is also a modern parish church. Pop. (1901), 1788.

ASARABACCA. See next article.

ASARUM, a genus of plants of the natural order Aristolochiaceæ, characterized by having the calyx bell-shaped and three-lobed, the stamens placed on the ovarium, the style short, stigma stellate and six-lobed, the fruit capsular and six-celled. *A. Europœum* is found growing in woods in several parts of England, particularly Lancashire and Westmoreland. It has a short stem, with two shining kidney-shaped leaves on long stalks, and a purplish flower between them. The powder of the roots and leaves, known as *asarabacca*, is the basis of most cephalic snuffs, which cause sneezing by their irritation, and are used in cases of headache and ophthalmia. Taken into the stomach in the form of a very fine powder asarabacca acts as an emetic, but from the violence of its effects it has been superseded by ipecacuanha. In coarser powder it generally purges, and in veterinary medicine it is still administered as an emetic and purgative. A crystalline substance called asarine and a volatile oil exist in the plant, and to these it owes its active properties. *A. Canadense*, wild ginger or Canada snake-root, is used as a stimulant and diaphoretic.

ASBEN, AIR, or AHIR, a kingdom of Africa, in the Sahara, between lat. 16° 15′ and 20° 15′ N., and lon. 6° 15′ and 9° 30′ E.; area about 49,000 square miles. It consists of a succession of mountain groups and valleys with a generally western slope, and attains in its highest summits a height of over 6000 feet. The valleys, though separated by complete deserts, are very fertile, and often of picturesque appearance, presenting masses of greenery, in which several species of mimosa and acacia and various kinds of trees flourish in luxuriant growth, sometimes garlanded and festooned by parasitical plants. The animals comprise the giraffe, hyena, jackal, wolf, wild boar, wild ox, &c. The climate is on the whole healthy, and not unsuitable for Europeans. The principal vegetable productions are millet, wine, dates, senna, indigo, and various kinds of vegetables. The most important mineral is salt. The inhabitants, called Tuaregs, seem to be a mixed race of Berbers and negroes. They generally profess Mohammedanism, and are a warlike, marauding people. The chief town is Agades. Pop. about 64,000.

ASBESTOS, a mineral substance, presenting much diversity in its structure and colour. It occurs in long, parallel, extremely slender and flexible fibres (amianthus); in finely interwoven and closely-matted filaments, forming flat pieces (mountain leather); in fibres interlaced so as to form numerous cells resembling cork (mountain cork); in hard, brittle, slightly-curved fibres (mountain wood); and in compactly-fibrous masses, harder and heavier than the other varieties (common asbestos). Its most common colours are gray, yellow, green, and blue, intermingled with white. It is found in all countries more or less abundantly, and exists, forming veins, in serpentine, mica-slate, and primitive limestone rocks. Amianthus, the most delicate variety, has long been brought from Savoy and Corsica. Its fibrous texture and the little alteration it undergoes in strong heats caused it to be used at an early period as an article for the fabrication of cloth, which, when soiled, was purified by throwing it into the fire, from whence it always came out clear and perfectly white; hence it obtained the name of *amiantos* or *undefiled*. By the Romans this cloth was purchased at an exorbitant price for the purpose of wrapping up the bodies of the dead previously to their being laid upon the funeral pile. The operations preparatory to making the cloth consist in soaking the amianthus in warm water, rubbing it with the fingers, soaking the filaments in oil, when they are mingled with a little cotton, and spun much in the ordinary way. When woven into cloth the fabric is heated red-hot, and the oil and cotton consumed, leaving only a tissue of pure amianthus. Paper may also be formed from this substance in the way in which common paper is made, except that more size is requisite. Books have even been printed on such paper. The manufacture and use of asbestos has recently undergone great development, and the purposes for which it is now employed are exceedingly numerous. Thus, incombustible cloth, gloves, felt, paper, &c., are made of it; it is employed in gas fires, when it speedily becomes red-hot and sends out a great heat; it is much used as a covering and packing for steam boilers and pipes; mixed with metallic pigments it is used as a paint on wooden structures to render them fireproof. Much of it comes from Italy, Canada, and Australia.

ASCALON, or ASHKELON, formerly a town of Palestine, on the sea-coast, 40 miles W.S.W. of Jerusalem. It was noted during the Crusades. Its site is now a complete scene of desolation.

ASCARIS. See NEMATELMIA.

ASCENDANTS, in law, are opposed to *descendants* in succession—that is, when a father succeeds his son or an uncle his nephew, &c., the inheritance is said to *ascend* or to go to *ascendants*. See DESCENT.

ASCENSION, an island of volcanic origin, near the middle of the South Atlantic Ocean, about lat. 7° 55′ S.; lon. 14° 21′ W.; area about 34 square miles. It is the sanitarium for the British West African squadron, also a coaling and victualling station, and store depot under the admiralty, who prohibit civilians from settling. There are about 400 inhabitants, consisting of government employees and their families, with Kroomen from Africa. The island used to be nearly devoid of vegetation, except on the Green Mountain (2650 feet high), but grass, trees, shrubs, &c., have been introduced, and potatoes, cabbages, and other vegetables are produced. Ascension is celebrated for its turtle, which weigh in

many cases from 500 to 800 lbs. Wild goats are plentiful, and there is a good supply of game—pheasants, Cape grouse, Guinea-fowl, and rabbits, all of which have been introduced. Oxen and sheep were brought from the Cape, and thrive well on the island. It is in direct communication with England, the Cape of Good Hope, and St. Helena, the Cape mail steamers calling regularly once a month. The climate, although hot, is equable and agreeable, as the island lies directly in the track of the south-east trades. There is at least one good spring on the island, but the rainfall is rather scanty and water scarce. The settlement, George Town, on the north-west coast, where vessels anchor, receives a supply of surface water by pipes from the high grounds, the water being stored in tanks. This island was discovered in 1502 by the Portuguese; but it was never formally occupied by any nation till Britain took possession of it in 1815, after the transportation of Napoleon to St. Helena.

ASCENSION, Right, a term used in astronomy when a person is speaking of the position of a star or other heavenly body. The position of a star is known when we know its right ascension and declination, these terms corresponding respectively to longitude and latitude as applied to the position of places on the globe. Right ascension is measured on the equinoctial or celestial equator, the first point of Aries being taken as the starting-point; and the right ascension of any star is the distance in degrees, minutes, and seconds from this point to the point where a great circle, passing through the star, cuts the equator. The right ascension is easily found by means of the sidereal clock, which, when the first point of Aries passes the meridian, gives the time as 0 hours, 0 minutes, 0 seconds. By noting on the clock the time at which the body is on the meridian, we obtain the right ascension *in time*, which may be converted into degrees, minutes, and seconds at the rate of one hour to 15°.

ASCENSION DAY, the day on which the ascension of the Saviour is commemorated, often called *Holy Thursday*. It is a movable feast, always falling on the Thursday but one before Whitsuntide. For the ascension of the Virgin, a feast of the Roman Catholic Church, see Assumption.

ASCETICS, a name given in ancient times to those Christians who devoted themselves to severe exercises of piety, and strove to distinguish themselves from the world by abstinence from sensual enjoyments and by voluntary penances. Hence those writings which teach the spiritual exercises of piety are termed ascetic writings. Even before Christ, and in the times of the first Christian church, there were similar ascetics among the Jews (see Essenes), also among the philosophers of Greece, and in particular among the Platonics. The expression ascetic is borrowed from the Greek word *askēsis* (exercise), used by the ancient Greeks to signify the spare diet of the athletæ, who, to prepare themselves for their combats, abstained from many indulgences. See Gnostics, Saints, Monastery.

ASCH, a manufacturing town in the extreme north-western corner of Bohemia, in the circle of Eger, on the railway between Hof and Eger, about 4 miles north of the Erzgebirge. It contains a large Protestant and a newly-erected Roman Catholic church, a real-school, schools of design, weaving, &c. The inhabitants are mainly employed in cotton, woollen, and silk manufacture, bleachfields, and dyeworks. Pop. (1900), 18,675.

ASCHAFFENBURG, a town of Bavaria, in the circle of Lower Franconia, situated on the Main and Aschaff, 26 miles E.S.E. of Frankfort. The chief edifice of the town is the fine castle of Johannisberg, built in 1605–14, and for centuries the summer residence of the elector. There is also the Pompeianum, an edifice built by King Louis of Bavaria, in imitation of the Casa del questore (commonly called the Castor and Pollux House) at Pompeii. Among other educational institutions, there is a lyceum, a gymnasium, a grammar-school, schools of trade and manufactures, &c. The principal industries are the manufactures of coloured paper, tobacco, and liqueurs. There are also large breweries, and an extensive trade is done in wine and timber. The scenery round the town is very beautiful. Aschaffenburg long belonged to the archbishops of Mainz. Pop. in 1910, 29,831.

ASCHAM, Roger, a learned Englishman of the sixteenth century, was born in 1515 of a respectable family in Yorkshire. He was entered at Cambridge, 1530, and was chosen fellow in 1534, and tutor in 1537. In this period of religious and literary revolution Ascham joined himself with those who were extending the bounds of knowledge. He became a Protestant, and applied himself to the study of Greek, which began about that time to be taught in England. There was yet no established lecturer of Greek; the university, therefore, appointed him to read in the open schools. He was not less eminent as a writer of Latin than as a teacher of Greek. He wrote all the public letters of the university, was afterwards Latin secretary to King Edward and also to Mary. Cardinal Pole, who was particularly eminent for his skill in Latin, employed him to translate for the pope his speech in the English Parliament. In 1544 he wrote his Toxophilus, or Schole of Shooting, in praise of his favourite amusement and exercise—archery. This book he presented to the king, who rewarded him with a pension of £10. In 1548 the Princess Elizabeth invited him to direct her studies, but after instructing her two years he left her without her consent, and soon after went to Germany as secretary to Sir R. Morisine. In this journey he wrote his Report of the Affairs in Germany. Upon the death of Edward he was recalled, but preserved the office of Latin secretary to Mary, although a Protestant, through the interest of Gardiner. Upon the accession of his pupil he was continued in his former employment, and was daily admitted to the presence of the queen to assist her studies or partake of her diversions, but received no very substantial marks of her bounty. In 1563 he was invited by Sir E. Sackville to write the Schoolmaster, a treatise on education, which, though completed, he did not publish. To this work, conceived with vigour and executed with accuracy, he principally owes his modern reputation. His style was, in his own age, mellifluous and eloquent, and is now valuable as a specimen of genuine English. He was never robust, and his death, which happened in 1568, was occasioned by his too close application to the composition of a poem, which he intended to present to the queen on the anniversary of her accession. His works were collected and published by Bennet, in one vol. 4to, 1769, with a life by Dr. Johnson.

ASCHERSLEBEN, a town of Prussian Saxony, in the district of Magdeburg, near the junction of the Eine with the Wipper, on the Magdeburg-Halberstadt Railway. It is walled and entered by five gates, and contains several churches, a synagogue, and a real school of the first class. The inhabitants are chiefly employed in agriculture and the manufacture of woollen goods, paper, sugar, artificial manures, earthenware, &c. Among several interesting ruins in the vicinity is the old castle of Askanien, the cradle of the house of Anhalt. Pop. in 1910, 28,968.

ASCIDIA (Greek, *askos*, a wine-skin), the name given to the 'Sea-squirts' or Tunicata, molluscous animals of low grade. These animals are found at low-water mark on the sea-beach, and are dredged from

deep water attached to stones, shells, and fixed objects. Each Ascidian presents externally the appearance of a wine-jar or double-necked bottle, hence the derivation of the name, the one aperture of the bottle corresponding to the mouth, and the other to the excretory aperture. The name *Tunicata*, applied to the class containing these animals, is given to the group from the tough outer case or *test* in which the body is inclosed. And a remarkable feature in the organization of these animals consists in the fact that a large proportion of this test is composed of *cellulose*, a starchy substance highly characteristic of plants. The mouth-opening leads into a large *branchial* or *breathing sac*, and from the bottom of this sac the digestive system—consisting of stomach and intestine—is contained; the intestine opening into a second sac, the *atrial chamber*. This latter cavity opens externally by the second aperture of the body, and also emits the effete water which has been used in breathing, and which passes into the atrial sac from the breathing-chamber. A single nervous mass or *ganglion* represents the nervous system; this mass being placed between the two apertures of the body. Male and female reproductive organs exist in each Ascidian. These animals may be *single* or *simple*, *social* and *compound*. They pass through peculiar phases of development, the young Ascidian appearing like a tadpole-body. According to the Darwinian theory of the evolution and development of living beings, the Ascidian larva represents the early progenitor of the Vertebrata; a cellular body which exists in the dorsal or back region of the larva being regarded as the primitive representative of the vertebrate notochord (which see) or backbone.

ASCLEPIADACEÆ, an order of gamopetalous exogenous plants, the distinguishing characteristic of which is that the anthers adhere to the five stigmatic processes, forming with them a single column. The members of this order are shrubs, or sometimes herbaceous plants, occasionally climbing, almost always with a milky juice. The leaves are simple and entire; the calyx with five divisions; the corolla hypogynous and regular; the stamens five in number, with the filaments usually united into a column; the styles two in number, with a common stigma; two ovaries; the fruit two follicles, of which one is, however, sometimes abortive; the seeds usually bearing a tuft of silky hair at the hilum or point of attachment. The order is a rather numerous one, inhabiting chiefly warm and tropical countries, but not confined to them, many species being found in northern regions. *Asclepias*, *Hoya*, *Cynanchum*, *Calotropis*, *Stapelia*, are among the principal genera. Their properties are acrid, stimulating, and sometimes emetic. Many of them are employed as purgatives, diaphoretics, tonics, and febrifuges, and others as articles of food.

ASCLEPIADES, the name of a number of ancient Greek writers—poets, grammarians, &c.—of whom little is known; and also of several ancient physicians, the most celebrated of whom was Asclepiades Bithynus, a native of Bithynia, who acquired considerable repute at Rome about the beginning of the first century B.C. He seems to have possessed a great deal of shrewdness and discretion, though but little real medical knowledge. To him is attributed the division of diseases into acute and chronic.

ASCLEPIAS, or Swallow-wort, a genus of plants belonging to the natural order Asclepiadaceæ, of which it is the type. The distinguishing marks of the genus are a reflexed 5-parted corolla, a 5-leaved corona seated on the upper part of the tube of the filaments; the leaflets cucullate, having a horn-shaped process protruding from the bottom; the anthers terminate by a membrane; pollen masses compressed, fixed by the tapering tops, pendulous; depressed stigma; smooth follicles; and coarse seeds. Most of the species are herbs and natives of North America, and many possess powerful medicinal properties. The roots of *A. tuberosa*, the butterfly-weed or pleurisy-root, a handsome garden plant, frequently found on sandy or stony soils, are used in the United States as a cathartic and diaphoretic. The emetic properties of *A. curassivica* have procured for it the name of wild ipecacuanha, in the West Indies. The roots of *A. prolifera* are also emetic. *A. Syriaca*, Syrian or Virginian swallow-wort, has a white acrid sap which contains caoutchouc, and which has been recommended as an expectorant. The sap of *A. lactifera* is drunk by the Hindus, and is a pleasant, wholesome beverage. Many of the species of *Asclepias* are handsome border flowers, and worthy of cultivation; they thrive well in peat earth, or in rich light soils. The tropical and subtropical species require the general treatment of other stove or greenhouse plants.

ASCOLI (the ancient *Asculum*), a fortified town of Italy, capital of the province of the same name, on the right bank of the Tronto, 14 miles above its embouchure in the Adriatic, 90 miles north-east of Rome. The town, one of the most ancient in Italy, is well built, and contains many handsome edifices and noble mansions, and the remains of an ancient theatre, temples, &c. It has manufactories of woollen cloths, leather, hats, cream of tartar, china-ware, sealing-wax, paper, and glass. It has an active trade, and its port, at the mouth of the river Tronto, is much frequented by coasting vessels. Pop. 28,882.

ASDOUD, Esdud, or Shdood (ancient, *Ashdod* and *Azotus*), a village in Palestine, 20 miles north by east of Ascalon between 3 and 4 miles from the Mediterranean, on the top of a grassy hill, surrounded by thick plantations, beautiful pastures, and a finely undulating country. Although occupying the site of an ancient city of note, it exhibits no remains either of antiquity or of grandeur. Asdoud was one of the five satrapies or lordships of the Philistines, who kept possession of it long after the Israelites were masters of the land. In the New Testament it is mentioned under the name of Azotus, as the place where Philip was found after his meeting with the Ethiopian eunuch.

ASELLI, or Asellius, Caspar, an Italian anatomist, born at Cremona in 1581. He studied medicine, and became professor of anatomy in the University of Pavia, where he highly distinguished himself by discovering the lacteals, a system of vessels the office of which is to absorb the chyle formed in the stomach, and thus contribute to the support of animal life. Aselli first observed these vessels in dissecting a living dog. His investigations were published the year after his death at Milan, namely in 1627.

ASEN. See Northern Mythology.

ASH (*Fraxinus*), a genus of trees belonging to the natural order Oleaceæ, having flowers destitute of a corolla, and a seed-vessel prolonged into a thin wing at the apex (called a *samara*). There are a good many species, chiefly indigenous to Europe and North America. The common ash (*F. excelsior*) is indigenous to Britain, and is a well-known tree. The stem is covered with a smooth bark, and grows tall and rather slender. The branches are flattened; the leaves have five pairs of lobes, terminated by an odd one of a dark-green colour; lanceolate, with serrated edges. The flowers are produced in loose spikes from the sides of the branches, and are succeeded by flat seeds which ripen in autumn. In its period of leafing the ash is very late, being generally towards the end of April or middle of May. It is also among the first to shed its leaves on the first approaches of the

autumnal frosts. The varieties of this species are the weeping-ash (*pendula*), first discovered in a field at Gamblingay, Cambridgeshire; the yellow barked (*jaspidea*), and the green curled leaved (*atrovirens*). It has been known from the remotest period, and is very generally diffused. It agrees with a greater variety of soil and situation than perhaps any other tree producing timber of equal value; and, differing from many other trees, its value is increased rather than diminished by the rapidity of its growth. On very poor soils, where it grows stunted, it is brittle, and soon affected by the rot; but where the growth has been vigorous, the compact part of the several layers bears a greater proportion to the spongy, and the timber is very tough, elastic, and durable. In elasticity it is far superior to the oak, and it is not so liable to be broken by a cross strain; but it is much more fibrous, and more easily split. The ash is, by way of eminence, called the 'husbandman's tree,' nothing being equal to it for agricultural implements, and for all sorts of poles, ladders, long handles, and other purposes which require strength and elasticity combined with comparative lightness. The thinnings of young plantations, and the suckers that spring up from the roots of grown trees, or from the stools of trees that have been cut down, are excellent for hoops, hop-poles, and every other purpose where clean, light, and strong rods are wanted at small expense. The leaves, and even the twigs, are eaten by cattle with great avidity; the bark is useful in tanning, and the wood yields, when burned, a considerable quantity of potash. The drip of the ash is injurious to most other plants, and therefore, when it is planted in corn-fields, a certain portion round it is unproductive; but in marshy situations the roots of it, which run a long way at a considerable depth, act as under-drains. Hence the proverb, in some parts of the country, 'May your footfall be by the root of an ash,'—may you get a firm footing.

Gilpin, in his work on Forest Scenery, calls the oak the Hercules of the Forest, and the ash the Venus. The chief characteristic of the one is strength; of the other, elegance. The ash carries its principal stem higher than the oak; its whole appearance is that of lightness, and the looseness of the leaves corresponds with the lightness of the spray. Its bloom is one of the most beautiful appearances of vegetation. The ash, however, drops its leaves very early; and instead of contributing its tint to the many-coloured foliage of the autumnal woods, it presents wide blanks of desolated boughs. In old age, too, it loses that grandeur and beauty which the oak preserves.

There are about fifty species of the ash enumerated, a considerable proportion of these being natives of America. The flowering-ash (*F. ornus*) is a native of the southern parts of Europe, and is said to be that which chiefly produces the substance called manna, although other species, as the *excelsior* and *rotundifolia*, also furnish it. This substance is secreted from the inner bark, and is a species of sugar. In Sicily the three species we have mentioned are regularly cultivated for the purpose of procuring manna, and with this view are planted on the declivities of the hills, with an eastern aspect. After ten years they begin to yield this substance, which exudes from incisions made on the bark by means of a sharp crooked instrument. These incisions are first made in the lower part of the trunk, and repeated at the distance of an inch from the former wound, still extending the incisions upwards as far as the branches, and confining them to one side of the tree, the other side being reserved till the year following, when it undergoes the same treatment. On making these incisions, which are of a longitudinal direction about a span long, and nearly 2 inches wide, a thick whitish juice immediately begins to flow, which gradually hardens on the bark, and in the course of eight days it acquires the consistence and appearance in which the manna is imported into Britain.

ASH, the fixed residue obtained by burning any part of an organized substance in air. Ash usually contains the following, or some of the following, metallic and non-metallic elements:—

Metals.	Non-metals.
Potassium.	Chlorine.
Sodium.	Bromine.
Calcium.	Iodine.
Barium.	Phosphorus.
Iron.	Sulphur.
Magnesium.	Silicon.
Manganese.	Carbon.
Aluminium.	
Copper.	
Zinc.	

These substances are combined together in various forms in the living body of the plant or animal; they are derived from the soil in the case of plants, and chiefly from plants in the case of animals. Different parts of the animal or vegetable frame are characterized by differences in the ash which they leave when burned; thus ash of bones consists largely of phosphate of calcium; the animal fluids and the juices of plants contain chloride of sodium; sea-plants leave an ash rich in alkaline carbonates, and also characterized by the presence of bromides and iodides of the alkalies. (See BARILLA and KELP.) Many grasses contain large quantities of silica, which appears in the ash of these plants. An examination of the ash of plants often leads to important conclusions as to the most suitable manure to employ for enriching the soil in which the plants are to be grown.

ASHANTEE, a kingdom of Western Africa, in the 'hinterland' of the British colony of the Gold Coast, to which it is now attached. Its limits have varied at different times, and its boundaries cannot be stated with any definiteness, but its area may be roughly estimated at 20,000 square miles, though at one time it greatly exceeded this. On the west it is now bounded by French territory, on the east by German (Togoland), on the south it has the Gold Coast Colony proper, on the north the Northern Territories. It is in general hilly, though it contains no great elevations, and is largely covered with forests. It is well watered and extremely fertile, but the climate is unhealthy. Among the trees are the baobab, palms, and cotton trees, with rubber trees, kola trees, &c. The crops include rice, millet, maize, cotton, sugar-cane, and yams, the last much used for food by the natives. Cocoa and rubber are also grown for export. The domestic animals are cattle, horses of small size, goats, and a species of hairy sheep. The larger wild animals are the elephant, rhinoceros, buffalo, lion, hippopotamus, &c. Birds are numerous, and crocodiles and other reptiles occur. Gold is fairly abundant, and in recent times mining concessions have been granted and various mines are now worked. Gold to the value of £300,000 was produced in 1909, the railway from the port of Sekondi to Coomassie serving to promote this industry. The Ashantees long made themselves well known as being warlike and ferocious, with a love of shedding human blood amounting to a passion. On the death of a king or chief enormous numbers of victims were slaughtered, and there were regular periods when human sacrifices were made. Notwithstanding this the Ashantees are far from mere savages. They excel in the manufacture of cotton cloths, and in the fabrication of articles in gold; they make good earthenware, tan leather, and make excellent sword-blades. The native king used to be quite absolute, and each chief had absolute power over his vassals. The chief

town is Coomassie or Kumasi. The Ashantee nation is said to have been formed by native tribes driven south by the tide of Moslem invasion. The Fantees, who were driven further south by a famine, originally formed part of it. The names originally Fantee and Santee are said to be derived from their respective diets, *fan* signifying herbs, *san*, Indian-corn or other grain. The kingdom of Ashantee was originally small, but by conquest acquired noteworthy extent and power. The British first came in contact with the Ashantees in 1807, a small body of troops in the fort of Anamaboe having assisted the Fantees against an attack made upon this town by the Ashantees. The town was taken and the inhabitants slaughtered, but the British fort held out. A treaty was, however, concluded by the governor of Cape Coast with the King of Ashantee, acknowledging the sovereignty of the latter by right of conquest over the coast, including Cape Coast Castle. In 1816 the fort of Cape Coast Castle was blockaded by the Ashantees on account of aid lent to the Fantees by the British, and the enemy was only induced to withdraw by the payment of a large sum of money. In 1821, on the African Company being abolished by act of Parliament, and its forts and possessions transferred to the crown, Sir Charles Mac Carthy was sent out to the Gold Coast as governor. Though some negotiations had recently been concluded with the Ashantees by an agent sent from home, he adopted the Fantee alliance. In 1823 war was proclaimed by the Ashantees against the British, and they succeeded in the following year in defeating a small body of troops led by the governor, who perished with almost all his officers; but in 1826 the Ashantees were completely defeated near Accra. At the close of another war, in 1831, the river Prah was fixed as the boundary between the Ashantee kingdom and the states protected by Britain, but the Ashantees soon began to interfere beyond the boundary. In 1864 some coloured troops were sent against the Ashantees, who had attacked the Fantees, but sickness disabled this force, and peace was concluded in 1866. Early in 1873 the Ashantees again invaded the territory protected by Britain, the King of Ashantee claiming Elmina and other places that had been ceded by the Dutch to the British, and retaining certain missionaries and others as prisoners. An expedition under General Wolseley (subsequently Viscount Wolseley) was now sent against them. It arrived on the coast at the beginning of December; and in the beginning of 1874 marched up the country. The British force consisted of about 2400 men, partly native and West Indian troops. The Ashantees having retreated across the Prah, it was determined to march into their territory. On 2nd January, when General Wolseley arrived at Prahsu, on the British side of the river Prah, he was met by messengers from King Koffee Kalkalli offering peace. Similar demonstrations were artfully kept up during the British march, and the king liberated some of his prisoners to serve as intermediaries. General Wolseley arrived at Fommanah in the Ashantee territory on the 24th. Deceived by the overtures of the king he suspended his march and telegraphed home that the war was concluded without bloodshed; but he soon discovered that active preparations were making for resistance, and by the end of January the negotiations were broken off. The Ashantee general Amanquantia had concentrated his troops, 20,000 strong, at Amoaful, 20 miles from Coomassie. They were armed with old muskets, many of which had belonged to the troops of Napoleon I. The British general led to the attack 1481 English and 708 native troops, whom he formed into a square. The battle began on the 31st of January, on which day Amoaful was taken. The British continued to advance fighting, the enemy at the same time attempting to break in upon their rear by attacking the troops left at Fommanah. On the 4th Coomassie was entered. The loss of the British in killed and wounded was 300, and a large number ultimately succumbed to the climate. As the king refused to enter Coomassie to sign a treaty, the British set fire to the town, and began their return march on the 6th. At Fommanah (February 13) the deputies of the king waited on General Wolseley and promised submission to his terms. The treaty signed soon after stipulated that the King of Ashantee should renounce his claims to the protectorate over the allies of Great Britain; that free-trade and open communication should be established with the coast, and that the king should pay an indemnity of 50,000 ozs. of gold. The last condition was not faithfully observed, but the result of the war was greatly to weaken the power of the Ashantees. The conduct of King Prempeh, a successor of King Koffee, led to the despatch of another British expedition, which early in 1896 entered Coomassie without resistance, and received the abject submission of the king, who was taken and sent into banishment. A British commissioner has been stationed in the country, which is now a British protectorate, subordinate to the governor of the Gold Coast. The native chiefs are still allowed a certain measure of power. In 1900 a rising of the Ashantees had to be put down by the British, not without hard fighting. Roads, railways, education, sanitation, &c., are now being attended to, and agriculture is encouraged. Pop. estimated at about 500,000.

ASHBOURNE, or ASHBORNE, a market-town of England, in Derbyshire, situated in a picturesque district, 13 miles N.W. of Derby, with a fine old church, a grammar-school, &c. Pop. (1901), 4039.

ASHBURTON, a town in Devonshire, England, in a valley surrounded by hills, near the river Dart. It was formerly a parl. bor., but ceased to be so in 1868. Pop. (1891), 2762; (1901), 2628.

ASHBY-DE-LA-ZOUCH, a market-town in Leicestershire, England, on the borders of Derbyshire, on the Midland Railway. The town has wide well-paved streets, and has a handsome church with stained-glass windows, carvings, and monuments, besides other places of worship. There are endowed schools for boys and girls. The Ivanhoe baths attract visitors, the waters being beneficial for some ailments, The ruins of Ashby Castle, which received Mary Queen of Scots as a prisoner, and her son James and his queen as guests, are still visible. Pop. (1901), 4722.

ASHDOD. See ASDOUD.

ASHES. See ASH.

ASHFORD, a market-town in Kent, pleasantly situated on a gentle eminence, near the confluence of the upper branches of the river Stour. It contains handsome houses, a fine church, and other important public buildings. There are corn and cattle markets, and the South-Eastern Railway Company have their principal locomotive and carriage establishment here, which gives employment to a large number of hands. Pop. (1901), 12,808.

ASHMOLE, ELIAS, a celebrated English antiquary and virtuoso, born at Lichfield in 1617, was sent to London at the age of sixteen, where he studied law and other branches of knowledge, and practised as a chancery solicitor. After the breaking out of the civil war he retired to Oxford, and entered himself of Brasenose College, where he engaged in the study of natural philosophy, mathematics, and astronomy. On the ruin of the king's affairs he returned to London, and formed a close intimacy with the

ASIA
BY J BARTHOLOMEW, F.R.G.S
English Miles
Kilometres
Spitzbergen
Iceland
Franz Josef Land
Novaia Zemlia
Kara Sea
ARCTIC
Arctic Circle
BRITISH ISLES
NORTH SEA
SWEDEN
NORWAY
Gulf of Bothnia
Kola
White Sea
Archangel
BALTIC
Riga
PETERSBURG
RUSSIA
Tobolsk
Berezov
Obdorsk
GERMANY
EUROPE
Moscow
Volga
Perm
Kazan
Kama
Orenburg
Ural Mts.
Uralsk
Turgai
Akmolinsk
Semipalatinsk
AUSTRIA HUNGARY
ROUMANIA
SERVIA
ITALY
Adriatic Sea
Danube
Odessa
Sea of Azov
Crimea
Sebastopol
BLACK SEA
Caucasus
Caspian Sea
Astrakhan
Aralsk
Sea of Aral
Syr Darya
Kizil Kum
Khiva
Amoo Daria
Trans-Caspian
TURKESTAN
Tashkent
Samarkand
Bokhara
Pamir
MEDITERRANEAN SEA
Crete
Asia Minor
Armenia
Cyprus
Barca
Alexandria
CAIRO
Suez
EGYPT
Nile
Tropic of Cancer
Syrian Desert
Damascus
Baghdad
Mosul
Euphrates
Tigris
Persian Gulf
PERSIA
Iranian Plateau
Meshed
Herat
AFGHANISTAN
Kandahar
Punjab
Delhi
Bombay
Arabian Desert
Hedjaz
NEJD
Wahabites
ARABIA
Red Sea
Mecca
Medina
Jiddah
Robaa el Khali (Desert)
Hadramaut
Mocha
Aden
Gulf of Aden
Socotra (Br.)
C. Guardafui
Ras Madrak
Muscat
Gulf of Oman
Persian Gulf
Kelat
Beluchistan
Karachi
Hyderabad
Jodhpoor
Bikaneer
Cutch
Gujerat Peninsula
Indus
Ahmedabad
Baroda
Surat
Bombay
Poonah
Kolapoor
Goa
Mangalore
Laccadive Is.
Maldive Is.
Cochin
Calicut
Trivanderam
Minicoy
C. Comorin
SOUDAN
ABYSSINIA
Khartum
Massowah
Berber
Abyssinian Highlands
Victoria Nyanza
Equator
INDIAN
SEA
Longitude
60
70
10
50
40
30
20
0

110 120 130 140 150 160 170
70 60 50 40 30 20 10 0
90 110 120 130
OCEAN
Jeannette
Bennett I.
New Siberia Is.
Wrangell Land
Long St.
Koliutchin B.
Bering Str.
St. Lawrence I.
Tshelyuskin
Bielkkov
Kotelnoi
Tchuk kchis
Gulf of Anadyr
C. Navarin
St. Matthew
Penin.
Thaddeus B.
Nordvik B.
Yadieyev I.
Liakhov I.
C. Shelagskoi
Bear Is.
Aion Is.
Anadyr
Delta of Lena
Sviatoi Nossa
Yakutsk
Verkhoyansk Mts
Kolymsk
Verkhne Kolymsk
Yukagirsk
Penjinsk
BERING SEA
Ulianska
Indigirska
Sashiversk
Kamchatka
Petropaulovsk
Lopatka
Komandorski Is.
Copper I.
Behring I.
Kamchatka Mts
Plothiskische
Tigilsk
Okhotsk
Taui
C. Alevin
Shantar Is.
C. Elizabeth
Karafto or Saghalien
Patience B.
Terpeniya B.
Sinustr
Kurile Is.
Broughton I.
Lapeyrouse Str.
Urup
Matsumai
Peter the Great B.
Aomori
Nugata
Sado I.
Yedo (YEDO)
Yokohama
Simoda
Oki Is.
Fusen
Ise Bay
Owari
Kino Chan.
Sikok I.
Nagasaki
Kagosima
Liu Kiu Is.
Vincheten Is.
Senkok Is.
Tchusan Is.
Napa
Majico Sima Group
Tropic of Cancer
Formosa Str.
Formosa
Hainan
Lingay
Manilla
PHILIPPINE ISLANDS (US)
Samar
Mindoro
Panay
Leyte
Mindanao
Palawan
Sulu Sea
Sulu Archipelago
Celebes
Gilolo
New Guinea
Ceram
Labuan
Borneo
Natuna
Anamba Is.
Tringano
Penang
Atcheen
Sumatra
Str. of Malacca
Malacca
Johore
Singapore Str.
Nicobar Is.
Salanga Is.
Andaman Is.
Kraw Isthmus
Gulf of Siam
C. Cambodia
Condor Is.
Cochin China
Pulo Panjang
C. Padaran
Saigon
Cambodia
Bangkok
Siam
Rangoon
Bassein
C. Negrais
Martaban
Moulmein
Pegu
Burma
Mandalay
Amarapura
Ava
Bhamo
Prome
Pakhoi
Hue
Paracel Is.
Kwang-nam
Kwang-ngai
Tonquin
Gulf of Tonquin
Hanoi
Lungchowfu
Kiang
Yunnan
Bhotan
Brahmaputra
Assam
Cachar
Manipur
Lassa
Tsaradsong
Tsangpo
Ching-tu
Tsaidam
Lob Nor
Koko Nor
Hami
Barkul
Gobi or Shamo Desert
Mongolia
Altai
Dsaghan
Uliassutai
Khangai Mts
Kobdo
Gt. Altai
Irtish
Kuldja
Ili
Ili R.
Kirghis
Steppes
Tarbagatai Mts
Lake Balkash
Alakul
Sea of Aral
Aralsk
Kamyr
Penjinsk
Gulf of Penjinsk
Okhotsk
Ayan
Shantar Is.
Elizabeth
Nikolaevsk
Karafto
Alexandrovsk
Saghalien
Dui

celebrated astrologers Moore, Lilly, and Booker. He subsequently married Lady Mainwaring, a rich widow. On this accession of fortune he gave up his profession, and his house in London became a resort of all the proficients and professors in the occult sciences. Ashmole about 1650 published, under another name, a treatise on alchemy, written by the celebrated Dr. Dee; and undertook to prepare for the press a complete collection of the manuscript writings of English chemists, under the title of Theatrum Chymicum Britannicum. Having for some time attached himself to the study of antiquities and the perusal of records, he began to collect materials for his celebrated Institution, Laws, and Ceremonies of the Order of the Garter. His love for botany having induced him to lodge with the celebrated gardener of Lambeth, John Tradescant, he obtained the curious collection of rarities got together by that person and his father. On the Restoration Ashmole was gratified with the post of Windsor herald, and received other appointments, both honourable and lucrative; was admitted a fellow of the Royal Society, and favoured with the diploma of a Doctor of Physic from the University of Oxford. In 1672 he presented to the king his work on the Order of the Garter, and in 1675 resigned his office of Windsor herald. An accidental fire in the Temple destroyed a library which he had been upwards of thirty years collecting, with a cabinet of 9000 coins, and other valuable antiquities. In 1683 he presented to the university of Oxford his Tradescantian collection of rarities, to which he afterwards added his books and MSS., thereby commencing the Museum Ashmoleanum at Oxford. He died in May, 1692. He left a number of MSS., several of which have been printed, and a diary of his life.

ASHTON-UNDER-LYNE, a market-town and municipal and parliamentary borough of Lancashire, England (the parliamentary borough is partly in Cheshire), 6 miles east of Manchester, on the north bank of the river Tame. It is a well built place, with handsome streets and public buildings. Among the latter may be mentioned the parish church, the town-hall, the market-house, assembly-rooms, public baths, infirmary, and near the town large infantry barracks. There is also a public park. Ashton has rapidly advanced within the present century through the extension of the cotton manufacture, both the spinning of cotton yarn and the weaving of calicoes being carried on in the town and parish to a great extent. Upwards of 20,000 work-people are employed in factories. There are also collieries and iron-works in the neighbourhood which employ a great many persons. There is ample means of communication by railways. Pop. of parl. bor. in 1871, 37,389; of mun. bor. 31,984; in 1891, 47,322 and 40,494; in 1901, 51,080 and 43,890.

ASH-WEDNESDAY, the first day of Lent, the fast of forty days preceding Easter. It derives its name from the ancient custom of putting ashes upon the head as a symbol of humble repentance for sin. In the Roman Catholic church it is part of the religious service on this day for the priest to put ashes on the forehead of each worshipper while kneeling at the altar rails. Originally it was only public penitents who had ashes put on their heads in this way, but latterly the rite was extended to all the faithful. In Rome the spectacle is highly impressive, when the people, after giving themselves up to every species of gaiety during the carnival till twelve o'clock on Tuesday, go on Ash-Wednesday morning into church, to take part in this solemn ceremony. To throw ashes on the head, as symbolical of humiliation and repentance, was an old custom among the Jews.

ASIA, the largest of the five great divisions of the earth called continents. Asia is absolutely the largest of the five continents, its area being greater than that of North and South America put together. Its length, from the extreme south-western point of Arabia, at the Strait of Bab-el-Mandeb, to the extreme north-eastern, East Cape, or Cape Vostochni, in Behring's Strait, is about 6900 miles; its breadth, from Cape Chelyuskin, or North-east Cape, in Siberia, to Cape Romania, the southern extremity of the Malay Peninsula, is about 5300 miles. The area is estimated at 17,296,000 square miles. Asia is connected with Europe on the north-west across the whole breadth of that continent; it is connected with Africa on the south-west only by the Isthmus of Suez; while in the extreme north-east it almost touches the American continent, being separated from it only by Behring's Strait. It is bounded on the north by the Arctic Ocean; on the east by the North Pacific Ocean, with its various arms or branches, Behring's Sea, the Sea of Okhotsk, the Sea of Japan, the Yellow Sea, and the China Sea; on the south by the Indian Ocean, with the China Sea, the Bay of Bengal, and the Arabian Sea; on the west by the Red Sea, the Mediterranean, the Archipelago or Ægean Sea, the Black Sea, the Caspian, the river Ural, and the Ural Mountains. The sinuosities of the coast of Asia on the south and east are very extensive, corresponding mainly with the seas already mentioned, to which we should also add the Persian Gulf and Sea of Oman, between Arabia and Persia, the Gulf of Siam on the east of the Malay Peninsula, and the Gulfs of Tonquin, Leao Tong, and others, formed by the seas on the eastern coast. The most prominent features of the southern coast are the three great peninsulas of Arabia, India, and the Indo-Chinese Peninsula. The east coast is also flanked with insular and peninsular projections, forming a series of sheltered seas and bays. A series of large islands extends to the south-east of the continent, forming a connection with Australia; while a multitude of smaller islands are scattered over the Pacific and Indian Oceans. The principal peninsulas on the east are Kamtchatka and Corea. The larger islands, proceeding from the north-east coast, are Saghalien, the Japanese Islands, the Philippine Islands, Borneo, Sumatra, Java, Celebes, the Moluccas, Papua or New Guinea, which, however, is Australasian rather than Asiatic, and lastly Ceylon at the south-eastern extremity of the Indian Peninsula. The Kurile Islands, between Kamtchatka and Japan, the islands of Loo Choo, Formosa, and Hainan on the Chinese coast, and the Andaman and Nicobar Islands in the Indian Ocean, may also be noticed. On the west or Mediterranean coast the principal islands belonging to Asia are Cyprus and Rhodes. The northern coast, from Cape East or Vostochni, in Behring's Strait, and on the Arctic circle, to the Yalmal Peninsula, in the extreme north-west, is almost entirely contained within that circle. The highest point, Cape Chelyuskin, is about 78° N. The largest group of islands on the north coast is the Liakhov Islands (New Siberia); the largest indentation is the Gulf of Obe, which reaches below the Arctic circle, and receives the river Obe about that latitude. The total extent of coast is estimated at 35,000 miles.

Mountains.—The mountain systems of Asia are of great extent, and their culminating points are the highest in the world. There are also vast plateaux and elevated valley regions, but large portions of the continent are low and flat. Such are the greater portion of Siberia, from the Ural Mountains across the north of the continent, and the western central region of the continent, where an

area of great depression culminates in the Caspian. The greatest mountain-system in Asia, and in so far at least as altitude is concerned, of the world, is the Himalayan system, the principal mass of which lies between lon. 65° and 110° E. and lat. 28° and 37° N. It thus occupies a position not very far from the centre of the continent, though nearer the southern edge than the northern. It extends, roughly speaking, from north-west to south-east, its total length being about 2000 miles, while its breadth varies from 100 to 500 or 600. Different names have been given to different portions of the system, such as Hindu Kush (the north-western extremity), Karakorum, and Kuen-Lun, while Himalaya is more especially confined to the portion forming the northern barrier of Hindustan; but all these are really portions of the same connected mountain mass. The Kuen-Lun simply forms the northern flank of the mass, and is not, as it has been represented, a distinct chain; while the Karakorum Mountains have so little to distinguish them from the rest of the elevated mass to which they belong that they may be crossed without the traveller being aware of it. The broadest part of the system, the elevated table-land of Tibet, lies between the Himalaya proper and the Kuen-Lun. The Tibetan mountains are connected on the east with the mountains of China and with those that spread to the south-east over the Indo-Chinese Peninsula. A second great mountain-system of Central Asia, connected with the Himalayan system by the elevated region of Pamir (say lon. 70°–80° E., lat. 37°–40° N.), is the Thian-Shan system. The point of junction may be said to form 'a huge boss or knot,' from which the Thian-Shan runs north-westward for a distance of some 1200 miles. Between these two systems, which curve round it on the west, lies Eastern Turkestan, right in the centre of Asia. The greatest elevations of the Himalayan system are to be found among the Himalayas proper, where is Mount Everest, 29,002 feet high, Kanchinjinga, 28,156, &c. The principal passes here, which rise to the height of 18,000 to 20,000 feet, are the highest in the world. The Kuen-Lun summits reach a height of 22,000 feet. The Himalayas descend by successive slopes to the plain of Northern India, which has an elevation of about 1000 feet above the level of the sea. The Vindhyas cross the peninsula, dividing Northern from Southern India; the latter is further bounded by the Eastern and the Western Ghats, which run along the coasts; while the interior consists of elevated table-lands rising towards the south, where they attain in the neighbourhood of the Nilgiri Hills an elevation of 7000 feet. The Himalayas are not only connected with the mountains in the interior of India, and with ramifications into China and the Indo-Chinese peninsula, but on the west with the mountains of Beluchistan and Afghanistan. The Suliman and Hala ranges bound India on the west, and unite with the mountains of Beluchistan; while the Hindu Kush, passing westward through the north of Afghanistan, has continuations more or less distinct through Persia to the Elburz range south of the Caspian, and so onwards to Mount Ararat. From this point again it forms connections with the mountains of Armenia, with the Caucasus, with the Taurus range in Asia Minor, and with the mountains which run to the south of Persia. The mountains belonging to this series form the boundaries of an elevated plateau extending from the Mediterranean to the Indus. On the north they are frequently of great elevation, Mount Demavend in the Elburz range reaching the height of 18,460 feet, while Ararat is nearly 17,000. The Thian-Shan system is continued to the north-east by the Altai and Sajansk ranges, the whole separating the Chinese Empire from Russian Turkestan and Siberia. Tengri-Khan in the Thian-Shan Mountains is estimated to have a height of 21,320 feet. A line of moderate elevation extends from the Altai westward to the Ural Mountains. To the east of the Sajansk range the Yablonoi Mountains run north-east towards the coast, along which they are continued northward under the name of Stanovoi to Behring's Strait.

Table-lands, Plains, and Deserts.—Tibet forms the most elevated table-land in Asia, its mean height being estimated at 15,000 feet. Its surface is very rugged, being intersected by a number of mountain ranges running generally in an easterly and westerly direction. On the east it is bounded by lofty mountains which separate it from China. Some of the largest rivers of Southern and South-eastern Asia have their origin in Tibet, including the Indus, the Brahmaputra, the Yang-tse, and the Hoang-Ho. In this region, which is still not well known, important discoveries were made in 1874–75 by the Pundit Nain Sing, who travelled from Yarkand to Lassa, over a route of which at least 1200 miles were unexplored. In particular he discovered a numerous series of lakes running in a chain parallel to the Himalayas. Another great plateau, much lower however than that of Tibet, is that already mentioned as occupying a large portion of Western Asia, extending from the Indus to the Mediterranean, and from the Persian Gulf to the Caspian Sea. It comprises the countries known as Afghanistan, Beluchistan, Persia, Armenia, and Asia Minor. It lies at altitudes varying from 2000 to 8000 feet above the sea. The eastern half of it consists to a large extent of unproductive wastes. Another table-land of smaller extent and elevation is that of the Indian Peninsula, south of the parallel of lat. 25° N. The principal plain of Asia, as already mentioned, is that of Siberia, which extends along the north of the continent and forms a vast alluvial tract sloping to the Arctic Ocean, and traversed by large rivers, such as the Obe, the Yenisei, and the Lena, that convey its drainage to that ocean. Vast swamps or peat-mosses called *tundras* cover large portions of this region. South-west of Siberia, and stretching eastward from the Caspian to the Thian-Shan Mountains, is a low-lying tract, consisting to a great extent of steppes and deserts, and including in its area the Sea of Aral, Bokhara, Khiva, and other districts. This is a region of internal drainage, the rivers, among which are the Amoo Daria and the Syr Daria, either falling into the Sea of Aral or into other smaller sheets of water. In the east of China there is an alluvial plain of some 200,000 square miles in extent, most of it productive and highly cultivated; in Hindustan there are plains extending for 2000 miles along the south slope of the Himalayas; and between Arabia and Persia, watered by the Tigris and Euphrates, is the plain of Mesopotamia or Assyria, one of the richest in the world. Of the deserts of Asia the largest is that of Gobi, which is bounded on the north by the Yablonoi and Thian-Shan Mountains, on the south by Tibet, on the east by the Khingan Mountains on the borders of China; while in the west it extends into Eastern Turkestan. Large portions of it are covered with nothing but sand or display a surface of bare rock. This desert forms a large part of the country known as Mongolia, the whole of which forms an area of internal drainage, deficient in rainfall. There are also extensive desert tracts in Persia, Arabia, and Hindustan. An almost continuous desert region may be traced from the African desert through Arabia, Persia, and Beluchistan to the Indus.

Rivers and Lakes.—Asia contains some of the largest rivers in the world. It is remarkable among the continents for the number of its rivers, some of

them of large size, that never find their way to the ocean, their waters either being lost in the sand or falling into lakes that have no outlet. The chief rivers in Western Asia are the Tigris and Euphrates, that rise in the Armenian plateau and fall into the Persian Gulf; the Indus, from the Tibetan plateau, flows through North-western Hindustan and falls into the Arabian Sea; the Ganges, which rises in the Himalayas and flows eastwards through Northern Hindustan, and the Brahmaputra, which rises in Tibet and flows through Assam and Bengal, both enter the Bay of Bengal; the Irawady and the Salwen, rising in the mountains of the Indo-Chinese Peninsula, and both flowing through Burmah, likewise enter the Bay of Bengal; the Mekong or Cambodia, the largest river of this peninsula, has its sources in the same mountains, and flowing south-eastwards enters the South China Sea; the Yang-tse and the Hoang-ho, the two great rivers of China, rise in the Tibetan plateau, and enter the ocean after a winding easterly course; the Amoor, the only other great river of Eastern Asia, rises in Mongolia, and after a circuitous course enters the Sea of Okhotsk; the great rivers of Northern Asia, the Lena, Yenisei, and Obe, have already been mentioned. The Yenisei is believed to have a length of 3400 miles, the Yang-tse of at least 3000, the Lena of 2770, the Hoang-Ho of 2600. The basin of the Obe, including of course those of its tributaries the Tobol and the Irtish, is believed to be the largest of any river in the world, except the Amazon and the Mississippi, being considerably over 1,000,000 square miles in area.

The largest lake of Asia is the Caspian Sea, which, however, is partly in Europe, its largest tributary being the Volga. The chief Asiatic rivers falling into this sea are the Kur from the Caucasus, the Aras from Armenia, and the Atrek from Northern Persia—the river Ural being partly European partly Asiatic. The Caspian lies in the centre of a great depression, being 83 feet below the level of the Sea of Azof. East from the Caspian, as already mentioned, is the Sea of Aral, which, like the Caspian, has no outlet, and is fed by the rivers Amoo Daria and Syr Daria. Its area is estimated at 27,000 square miles. Still farther east, to the north of the Thian-Shan Mountains, and fed by the Ili and other streams from this system, is Lake Balkash, a somewhat crescent-shaped sheet of water, with an area of 3400 square miles. The lake has no outlet; its water is clear but very salt and disagreeable. There are also several other smaller lakes in this region, such as Issik-Kul, Kara-Kul, Ala-Kul, Baratala, &c. In the south of Siberia, between lon. 104° and 110° E., is Lake Baikal, a mountain lake from which the Yenisei draws a portion of its waters; its area is estimated at about 12,500 square miles. In the very centre of the continent is the Lob Lake, or Lob Nor, to which all the drainage of Eastern Turkestan converges, being conveyed to it by the Yarkand, Kashgar, and other streams. These unite to form the Tarim River, which, from the source of the Yarkand, has a total length of over 1200 miles. Lob seems to be rather a swampy tract than a lake proper. On the borders of Afghanistan, Persia, and Beluchistan, is a similar swampy lake that receives the Helmund and other streams from Afghanistan. Of the numerous lakes in Tibet Dangra-yum Nor and Tengri Nor seem to be the largest; the former is 45 miles long and 25 broad.

Geology.—Though in population and history the most ancient continent, geologically speaking Asia is considered, as regards its present aspect, to be one of the newest. The principal mountain chains are composed largely of granitic rocks. The Himalayas, in which Humboldt has observed a striking resemblance in geological structure to the Alps, are composed of granite, gneiss, and mica-schist, with cyanite and amphibolites or trap-rocks, particularly primitive greenstone; the Altai Mountains contain granite in layers without alternation of gneiss; argillaceous schist in contact with greenstone, and containing augite, jaspar, calcareous rocks, argentiferous lead ore, and copper. The ramifications of the Altai into Russian Asia contain also coal-grit, schists, quartz, and greenstone, rich with lead, silver, and auriferous sand. The lower ranges are covered with transported layers of rolled stones of granite, gneiss, and porphyry, in which are found agates, cornelians, and chalcedonies. In the Kuen-lun group are found rubies, lapis-lazuli, and turquoises. In the eastern part of the Urals the granite, of which the chain is composed, along with gneiss and other rocks, is extremely rich in iron and copper. The Caucasus contains granite, argillaceous schist, and basaltic porphyry. The great plains of Northern India, Mesopotamia, Central Asia, and Siberia are regarded as of very recent geological origin. From various indications many geologists are of opinion that the greater part of Western Asia was occupied at no very distant period by an ocean, of which the Caspian and Aral Seas are the remains. It is also conjectured that a continental area extending across the Indian Ocean united Asia during the Permian period to Africa and Australia. Siberia is supposed to have been twice submerged during the palæozoic and the later tertiary period. A line of volcanic action extends on the eastern coast from Kamtchatka through the Philippines and the Malay Archipelago. The minerals include gold, silver, platinum, iron ore, copper, precious stones (Burma, Ceylon, &c.), petroleum (Baku, Burma), and coal (China, India).

Climate, Soil, &c.—The size of Asia, the great altitudes and depressions of the continent, along with the variations of latitude and the disposition of sea and land, &c., afford an inexhaustible source of complexity in the variety and distribution of climate. In Tibet, with a mean elevation of about 15,000 feet, the climate is rigorous, combining great cold with drought; vegetation is scanty, trees almost absent, and the population mostly nomadic. Except in the lower valleys, where there is an agricultural population, it is very sparse. The climate of Central Asia generally presents extremes of heat and cold, and great deficiency of rain. It has accordingly a deficient vegetation and a scanty nomadic population. The great region of Siberia, which, as already mentioned, is a level or slightly undulating plain, lying wholly within the temperate and frigid zones, has a climate which generally resembles that of similar latitudes in Europe, with the exception of greater heat and drought in summer and greater cold in winter. The rainfall is very moderate, but the drainage is deficient and the soil often becomes swampy. The vegetation is scanty, consisting mostly of grasses and shrubs in the plains and pine forests on the mountains. There is very little land under cultivation and the population is very thin. The northern part of China to the east of Central Asia has a temperate climate with a warm summer, and in the extreme north a severe winter. It is well watered and wooded, possesses a fertile and well-cultivated soil yielding the usual products of temperate regions, and is thickly peopled. The districts lying to the south of the central region, comprising the two Indian peninsulas, Southern China, and the adjacent islands, present the characteristic climate and vegetation of the southern temperate and tropical regions. Here, however, the modifying effects of altitude come most largely into play, and every variety of climate and form of vegetation is to be found on the slopes of the Himalayas, and the mountains and plains of

Southern India and of the eastern peninsula. The part of Asia south of the Himalayas, though not all lying within the tropics, is all subject to tropical influences. Among the principal of these may be reckoned the effects of the tropical heat upon the air-currents. To this cause are due the trade-winds, which, carrying the moisture of the southern seas to the continents to be condensed by the mountain masses against which they strike, by determining the rainfall of the various continental districts, and affecting the size and course of the rivers, produce so many climatic effects. More local in their effects as well as arbitrary in their occurrence, and consequently fatal in their violence, are the cyclones, or circular storms, common in the Bay of Bengal and the China Sea. The normal directions of the monsoons are north-east and south-west; the north-east monsoon begins in April and the south-west in October; but the direction, duration, and intensity of these winds are greatly modified, especially on land, by local circumstances. The soil of the southern regions is usually good, and where moisture is sufficient vegetation is rich and even exuberant. The soil of India is so finely comminuted that it has been said it is possible to go from the Bay of Bengal to the Indus and return again to the sea without finding a single pebble. The rainfall in those regions is extremely irregular. There are belts where hardly any rain falls at all, others of moderate, and others of very heavy rainfall. On the Khasia Hills, to the north-east of the delta of the Ganges and Brahmaputra, the heaviest rainfall in the world takes place, the average fall observed being 550 inches a year. The principal period of rain is during the south-west monsoon. On the mountains which directly face the winds, charged with vapour as they come from the sea, the rain will fall in abundance, while they pass over intermediate plains without parting with their moisture. The rainfall, the course of the rivers, and the irrigation and fertility of the plains of India is accordingly determined by the position of the Himalayas, the Ghats, and other mountain ranges. The high plateau which extends from Asia Minor to the Indus has a temperate climate, with some extremity of heat in summer and cold in winter. Rain falls chiefly in winter and spring. The eastern part of this plateau is deficient in rain, and the soil is poor and unproductive; the western portion, consisting of Asia Minor, is more favoured of nature. The desert character of large parts of Arabia, Persia, and Beluchistan has already been alluded to. Some parts of the coast of Arabia, as Yemen and Oman, are fertile, but the greater part, especially on the Red Sea, is barren and desolate. A desert belt surrounds an interior plateau of 1000 to 3000 feet in height, and of moderate fertility. Syria is divided between hilly and fertile and low desert tracts. The Japanese Islands, which are traversed by mountains of considerable elevation, and extend over about 15° of latitude, experience a great variety of climates. In the north the climate is rigorous, in the south as mild as that of the south of France. The eastern coast is milder than the west, being sheltered by the mountain ranges from the cold winds of the continent. The country generally is fertile and populous. The character and productions of the other islands are mostly tropical.

A greater extreme of cold is reached in North America than in Northern Asia, the mean temperature of the east coast of Siberia being above the zero of Fahrenheit; and the heat of Southern Asia is less than that of Africa, which has more land lying within the tropics. In Siberia the extremes of temperature are great, exceeding 100° between the mean of the hottest and coldest month on the coast, and being commonly over 60° throughout the country. As the equator is approached the extremes of temperature diminish till at the southern extremity of the continent they approach within 5°. The highest temperature attained in Southern Asia is about 112°, the highest mean about 82°. The summers of the northern latitudes, though shorter, attain a maximum of heat not much short of the tropics, the greater length of the day compensating for the less intensity of the mid-day heat. On the Persian plateau the summer heat is increased by the want of rain, and the severity of the winter by the elevation.

Vegetation.—The plants and animals of Northern Asia generally resemble those of similar latitudes in Europe, though the extremes of climate are greater. The plateau extending from Asia Minor to the Himalayas resembles Southern Europe in its productions, and the desert belt of Asia has an affinity to the African desert. The characteristic types of Siberia are continued to the high regions of Central Asia. The community of type with European forms also extends to North China, where is developed besides a relation with the types of North America. The whole of Northern Asia differs from Europe more in species than in genera of vegetable productions. Oaks and heaths are absent in Siberia. The principal mountain trees are the pine, larch, and birch; the willow, alder, and poplar are found in lower grounds. The cultivated plants of Asia Minor and Persia resemble those of Southern Europe. In the central region European species reach as far as the Western and Central Himalayas, but are rare in the Eastern. They are here met by Chinese and Japanese forms. The lower slopes of the Himalayas are clothed almost exclusively with tropical forms; higher up, between 4000 and 10,000 feet, is the region of forests and cultivation, producing all the types of trees and plants that belong to the temperate zone, and having extensive forests of conifers; in the east forest-trees are met with at a height of 13,000 feet. Rhododendrons extend to 14,000 feet, and phanerogamous plants are found at the height of 19,500 feet. The south-eastern region, including India, the Eastern Peninsula, and China, with the islands, contains a vast variety of indigenous species, varying with the humidity of the climate and the elevation, the forms of higher latitudes being represented on the mountains. In this region we find growing wild a number of plants that have become of the utmost importance to man, such as the sugar-cane, rice, cotton and indigo, pepper, cinnamon, cassia, clove, nutmeg, and cardamoms, banana, cocoa-nut, areca and sago palms; the mango and many other fruits, with plants producing a vast number of drugs, caoutchouc and gutta-percha. The forests of India contain the oak, teak, sāl, deodar, and other timber woods, besides bamboos, palms, sandal-wood, laurels, fig-trees, &c. The Malay Peninsula contains dense forests of similar kinds. The cultivated plants of India include wheat, barley, rice, maize, millet, sorghum, tea, indigo, jute, opium, &c. North of the tropic wheat is sown in November, and reaped early in April, and a crop of rice or other tropical cereal is sown in June and July, and reaped in September and October. Wheat and barley do not grow in Southern India, the winter not being sufficiently severe to prepare the ground for them. Cotton, indigo, sugar, tea, tobacco, coffee, pepper, plantains, mangoes, &c., are cultivated in China. Of the Chinese flora the larger portion resemble the Indian, while many are local. In North China, the country between it and the Amoor (Manchuria), and the Japanese Islands, large numbers of deciduous trees occur, such as oaks, maples, limes, walnuts, poplars and willows, the genera being European but the individual species

Asiatic. Among cultivated plants are wheat, and in favourable situations rice, cotton, the vine, &c. Japan and the northern parts of this region are rich in species of the pine tribe. According to elevation the islands of the Asiatic Archipelago display an equal diversity with the mainland, the more tropical types being represented on the lower elevations, the more northern on the higher. Coffee, rice, maize, &c., are extensively grown in some of the islands. A line of demarkation called Wallace's line has been drawn at the Strait of Macassar, at which the flora and fauna of Australia begin to appear, and gradually become more pronounced as the distance from Asia and the proximity to Australia increases. The variety of plants of the desert region of Arabia, Persia, and Beluchistan is comparatively small. The predominance of a few species gives character to the whole region. Vegetation is most abundant in spring, when herbaceous and bulbous plants, which extend through this region from Syria to the Himalayas, are abundant. In Arabia Felix, and the warmer valleys of Persia, Afghanistan, and Beluchistan, where the hills are high enough to afford a sufficient rainfall, aromatic shrubs are abundant. Wheat, barley, cotton, and indigo are cultivated in Arabia, and the date-palm flourishes in the desert. On the mountain slopes of Western Arabia (Arabia Felix) the coffee-plant, which has probably been derived from Africa, is cultivated. Gum-producing acacias are, with the date-palm, the commonest trees in Arabia; the latter also extends through Persia, and even reaches the shore of the Caspian. Fleshy plants are characteristic of the most arid portions. In the higher parts of Persia and Afghanistan numerous forms of Umbelliferæ of great size, as well as thistles and the borage tribe, are abundant. African forms are found not only extending from the African desert along the desert region of Asia, but from South Africa to Ceylon. The Caspian lowlands is the tract where the saline vegetation that is spread over the whole region of steppes and deserts has its greatest development. This region is regarded as the native country of the melon.

Zoology.—There is a still closer resemblance in the fauna than in the flora of Northern Asia to that of Europe. Asia south to the Himalayas, together with Europe and North Africa, forms a continuous region, which Dr. Sclater has designated as the Palæarctic; South-eastern Asia, with Sumatra, Java, Borneo, and the Philippines, he calls the Indian region; Africa south of the Atlas, with Arabia, Palestine, South Persia, the dry part of Beluchistan and Sind, form the Ethiopian region; Celebes and the other islands beyond Wallace's line, with Australasia, the Australian region. Nearly all the mammals of Europe occur in Northern Asia, with numerous additions to the species. Quadrumana are rare, Carnivora numerous, especially bears, wolves, and weasels. Moles, shrews, and hedgehogs are common among Insectivora. Rodents are represented by marmots and the pika or tailless hare. There are numerous species of wild sheep, antelopes, and deer. Of the last the musk-deer and the stag are characteristic. The ornithology of Europe and Northern Asia are identified to a still greater extent. A large majority of European species extend over Northern Asia as far as Japan. The pheasant proper in the wild state is peculiar to Northern Asia, the golden pheasant and several other species of pheasants to the north-east. The genera and species of passerine birds are very numerous. In the Indian region there are several peculiar genera of the Quadrumana or monkey tribe. Among the distinctive forms of this region is the elephant, the Asiatic species being distinct from the African. The lion, tiger, leopard, which are considered as Ethiopian forms, the bear, civets, ichneumons, and other carnivorous animals are found. The lion inhabits Arabia, Persia, Asia Minor, Beluchistan, &c., and extends as far east as India, being now, however, confined to Gujerat. The tiger is the most characteristic of the larger Asiatic Carnivora. It extends from Armenia across the entire continent, being absent, however, from the greater portion of Siberia and from the table-land of Tibet; it extends also into Sumatra, Java, and Bali. The horse, ass, and camel have their true home in Asia. In the Indian region we also find the rhinoceros, buffalo, ox, deer, squirrels, porcupines, as well as various species of Edentata. In birds nearly every order except ostriches is represented. Among the most interesting forms are the hornbills, the peacock, the Impey pheasant, the tragopans, and other gallinaceous birds, the pheasant family being very characteristic of the region. The desert region, extending from Arabia to Sind, is chiefly distinguished by the absence of many Indian forms and the presence of some African ones, which, however, are not widely spread, most of them being limited to Arabia and Syria. In the Malay Archipelago marsupial animals first occur in the Moluccas and Celebes, while various mammals common in the western part of the archipelago are absent. A similar transition towards the Australian type takes place in the species of birds. Of marine mammals the dugong is peculiar to the Indian Ocean; in the Ganges is found a peculiar species of dolphin. The chief haunts of the Reptilia of Asia are the northern portion of Hindustan, the south-eastern peninsula, China, and the islands of Ceylon, Sumatra, and Java. At the head of the Reptiles stands the Gangetic crocodile, frequenting the Ganges and other large rivers; the helmeted crocodile and the double-crested crocodile are numerous in various quarters, both insular and continental. Among the Serpents are the cobra da capello and a species of Trigonocephalus, both among the most deadly snakes in existence; there are also large boas and pythons, besides sea and fresh-water snakes. There are also a number of species of frogs and toads and of fresh-water tortoises, as well as chameleons and other lizards. The seas and rivers of Asia produce a great variety of fish. The Salmonidæ are found in the rivers flowing into the Arctic Ocean, but not in those of Southern Asia. Large numbers are caught. Trout are found in the feeders of the Indus and the Caspian. Sturgeons abound in the Black Sea and Caspian. Two rather remarkable kinds of fishes are the climbing perch and the archer fish. The well-known gold-fish is a native of China.

Asiatic Races.—The Mongolian race is the most numerous in Asia. It occupies the Chinese Empire, Tartary, and probably Japan, with part of the Indo-Chinese Peninsula. It is partly settled, as in China, Japan, and the peninsula; partly nomadic, as in Tartary and Mongolia. The Aryan is the next in numbers, and the most civilized of the Asiatic races. It was until the Mohammedan conquest the dominant, as it is still the most numerous, race in India. It also prevails in Persia and in the middle region from Afghanistan to Asia Minor. The Semitic race is widely spread in South-western Asia, and formerly at least extended to Africa. The Dravidian race in South India, the Malays in the eastern peninsula, and other races locally distributed, have no well-defined relation with the larger races. The Dravidians are variously associated with the Mongols and the Australians. The latter theory is connected with the hypothesis of a southern continent, which also connects these races with Africa. See ETHNOLOGY.

Political Divisions.—A large portion of Asia is

under the dominion of European powers. Russia possesses the whole of Northern Asia (Siberia) and a considerable portion of Central Asia, together with a great part of ancient Armenia, on the south of the Caucasus; Turkey holds Asia Minor, Syria and Palestine, part of Arabia, Mesopotamia, &c.; Great Britain rules over India, Ceylon, a part of the Indo-Chinese peninsula (Upper and Lower Burmah), and one or two other possessions; France has acquired a considerable portion of the Indo-Chinese Peninsula (Cochin-China, Anam, Tonquin, Cambodia), and has one or two small settlements besides, while to Holland belong Java, Sumatra, and other islands or parts of islands in the Asiatic or Malay Archipelago. The chief independent states under native rulers are the Chinese Empire, much the most populous of all; Japan, Siam, Afghanistan, and Persia. The total population of the continent is estimated at over 900,000,000.

History.—The origin of the name Asia is involved in obscurity, and it is not certainly known whether it arose among the Greeks or was borrowed by them from some Asiatic people. The Greeks seem to have applied it originally only to Lydia, the part of the continent with which they first became acquainted. Modern scholars are inclined to believe that the name Asia is connected with the Sanskrit *ushas*, the dawn, as 'Europe' may be connected with the Hebrew *ereb*, the west or the sun-setting.

Asia unquestionably possesses the oldest historical documents, and next to the immediately contiguous kingdom of Egypt the oldest historical monuments in the world. The oldest historical documents relating to Asia are contained in the Old Testament, and it is from these that we arrive at anything like certainty with regard to its early history. Whatever modern criticism may say as to the compilation of the books ascribed to Moses, they possess unquestionably the oldest historical records which we have in the form of distinct narrative of any nation. They also carry back the history of the human race to its origin. The great facts of the Mosaic record are that the human race originated in a part of Asia not far from the Euphrates and the Tigris; in one family at a period defined by a chronology, possibly not accurately transmitted, and difficult of interpretation, but which cannot carry the origin of the race back further than 4000 to 6000 years beyond the Christian era; that is, for more than 1000 or 2000 beyond the period for which there is independent historical testimony; that by the calamity of a universal deluge the race was again reduced to a single family, settled in Armenia, whence they spread abroad over the earth, and, especially after a supernatural confusion of their language, formed themselves into separate nations. Of these nations the Jewish is the one to which the Old Testament history is henceforth almost exclusively confined.

The oldest historical monuments in Asia are those of Assyria (see ASSYRIA), and with them are associated traditions which carry us back to a remote and indefinite antiquity. A similar vague antiquity belongs to the historical traditions of India and China. Criticism, however, reduces all these claims to moderate dimensions, and assigns to the oldest ascertained facts a period not more remote than some 4000 years from the present.

The earliest facts in the history of Asia apart from documents and monuments consist in the migrations of races, the evidence of which is derived from tradition, from language, from customs, and from religion. The earliest known seat of the Aryan race was on the banks of the Oxus. Hence probably from the pressure of the Mongolian tribes to the north they spread themselves to the south-east and south-west, pressing upon the Dravidian inhabitants of India and the Semitic races of South-western Asia. Finally they drove the Dravidians to the south of India and occupied Persia and other parts of Western Asia, spreading into Europe. It is a remarkable circumstance that in this invasion the Aryans appear to have acquired the use of letters from the peoples with whom they came in contact, the Dravidian letters being borrowed in India and the Semitic in Persia as the original basis of the Sanskrit and Zendic alphabets. At a later period the Greeks likewise adopted a Semitic alphabet from the Phœnicians. The Semites have spread within historical times into North Africa, and their migrations had probably taken a similar course before they were recorded in history. A large portion of the Mongols are still, as they have always been, a nomadic race, and their migrations, carrying everywhere the terror of predatory arms, have spread from the settled part of their own race in China along the north of Asia into Northern Europe.

The early religion of the Aryan race, that of a nation of shepherds, divided itself after their separation into two related but widely different developments, Brahmanism and Zoroastrism. (See INDIA—Religion, ZEND-AVESTA, &c.) The former became rich in mythological, theological, and philosophical literature; but historical literature properly so called is wanting, and consequently there is a great absence of certainty with regard to the dates of early events. The war which the Mahâbhârata (see SANSKRIT LANGUAGE AND LITERATURE) professes to narrate is believed to be the earliest event in Indian history that can be regarded as historical, and probably took place about 1200–1400 B.C. In China authentic history extends back probably to about 1100 B.C., with a long preceding period of which the names of dynasties are preserved without chronological arrangement. The kingdoms of Assyria, Babylonia, Media, and Persia, alternately predominated in South-western Asia. The arms of the Pharaohs also extended into Asia, but their conquests there were short-lived. From Cyrus (B.C. 559), who extended the empire of Persia from the Indus to the Mediterranean, while his son, Cambyses, added Egypt and Libya to it, to the conquest of Alexander (B.C. 330), Persia was the dominant power in Asia. The administration of Persia was not without vigour and policy, yet the Macedonian conquest was an event of great importance to Asia, bringing it, along with Northern Africa, into closer relation with the more advanced and progressive continent of Europe. The division of Alexander's empire led to the protracted struggle between the Greek dynasties of Egypt and Syria, which ended in the absorption of both kingdoms in the Roman Empire. After the unfortunate issue of the second Punic war Hannibal took refuge with Antiochus the Great of Syria, who, in the course of his conquests, had come in contact with the Romans, and was at length incited to try his strength with them. In the course of the war with Antiochus, L. Scipio, together with his brother, the conqueror of Carthage, passed into Asia. The kingdom of Antiochus was spared after his overthrow; but in B.C. 65 Syria became a Roman province. The Roman Empire ultimately extended to the Tigris.

The knowledge of Asia possessed by the Greeks and Romans was at its widest extent very limited. The countries with which they were best acquainted were naturally in the west. China they knew as the country of the Seres or Sinæ, and the northern portions of the continent, inhabited by predatory Mongol tribes, were vaguely designated as Scythia. Of India the north-western and western parts were known, and Ceylon likewise, under the name of Taprobane.

The country traversed by the Hindu Kush, and the sources of the Oxus, was known as Bactria; that between the Oxus and the Jaxartes as Sogdiana; a large and vaguely defined central district, including Persia, was known as Ariana. Ptolemy had some acquaintance with the Indian Peninsula, with the table-land of Central Asia, with the Himalayas (Imaus) and China. The better known countries of the south-west comprised Asia Minor, Armenia, Arabia, Persia, Media, Parthia, Mesopotamia, Babylonia, Assyria, Syria.

Soon after the most civilized portions of the three continents had been reduced under one empire the great event took place which forms the dividing line of history. Christianity spread rapidly in the Roman Empire; but Armenia was the first country which received it as a national religion. In A.D. 226 the Parthian monarchy which had arisen in Eastern Persia about B.C. 250, and had disputed the empire of Asia with the Romans, was overthrown by the revived Persian dynasty of the Sassanidæ. The empire of Asia was now disputed with the Romans by the Persians. In the revived Persian Empire the Magian religion was restored, and after the establishment of Christianity in the Roman Empire religious jealousy embittered the feud between the two powers. The possession of Armenia was the subject of a protracted struggle between them; but its religion inclined it to the Roman alliance. The Tigris formed the most permanent boundary between the two empires, neither being able long to maintain any conquests beyond it. Christianity was persecuted in the Persian Empire, and could not extend itself freely beyond the Roman limits. After the division of the Roman Empire (A.D. 364) the struggle continued between the Eastern and the Persian Empires until the rise of a new power destined to absorb them both. While the Eastern Empire was struggling more and more feebly with the Persians, the Mongols, and the barbarians of Europe, a new religion arose in Arabia (A.D. 622), which gathered around it a band of enthusiasts, small at first, but inspired with the most ardent zeal of proselytism. The central tenet of the unity of God gave them the sympathy of the Monophysite sect, which, persecuted in the empire, was powerful in Egypt, Syria, Mesopotamia, and Armenia. Arabia, the country of the Prophet, soon gave its adherence to the new faith. The sword was consecrated as the instrument of its propagation. Persia was the first great conquest of the Arabians. Syria and Egypt soon fell before their arms, powerfully aided by the defection of the heretics of the empire, and within forty years of the celebrated flight of Mohammed from Mecca, which constitutes the era of his followers, the sixth of the Caliphs, or successors of the Prophet, was the most powerful sovereign of Asia. Heraclius, one of the most warlike, and in the early part of his reign one of the most successful of the eastern emperors, had succumbed to this torrent of conquest and his successors trembled at the names of their rivals. The successors of Mohammed were at first austere and simple in their manners, and narrow and zealous in their religious faith; but from the accession of Moawiyah (A.D. 661), the time when the seat of empire was transferred first to Damascus and subsequently to Bagdad, the throne of the Caliphs was as splendid as it was powerful. The generous blood of Arabia, nourished by more genial climes, showed an aptitude for all that is great, not only in military achievement, but in learning, science, literature, and art. The empire was soon divided, but wherever the Arab sway prevailed a liberal patronage of learning and toleration even of speculative inquiry distinguished it. The career of conquest was not soon ended. It spread with astonishing rapidity over Africa and Europe, and was finally checked only by the fatal divisions which originated in the disputes between the descendants of the Prophet and the dynasty of the Ommiades, descended from his mortal foe and tardy convert Abu Sophian.

Among the alternate protectors and oppressors of the Eastern Roman Empire were the various Mongol tribes, whose predatory course led them to the west. In these also the Arab rulers found dangerous converts, who first supplied the place of their own troops, grown effeminate with luxury, and then supplanted themselves in the throne of which they had superseded the natural defenders. While the Caliphs of Bagdad still held a nominal sway, subject to the dictation of their Turkish guards, Mahmud, the Mongolian Mohammedan ruler of Ghazni, asserted his independence (999), conquered India, and established the Mogul dynasty. Another revolt from the empire of Mahmud founded the Seljuk dynasty, which established itself in Aleppo, Damascus, Iconium, and Kharism, and which was distinguished for its struggles with the Crusaders. Othman, an emir of the Seljuk sultan of Iconium, established the Ottoman Empire in 1300. About 1220 Genghis Khan, an independent Mongol chief, made himself master of Central Asia, conquered Northern China, overran Turkestan, Afghanistan, and Persia; his successors took Bagdad and extinguished the remains of the Caliphate. In Asia Minor they overthrew the Seljuk dynasty. His grandson, Kublai Khan, conquered China in 1260. The successors of Genghis Khan also invaded Russia, and the Christian empire established by Vladimir was overthrown by the Golden Horde, led by his grandson Batu (1240). Timur or Tamerlane, who professed to be a descendant of Genghis, carried fire and sword over Northern India and Western Asia, defeated and took prisoner Bajazet, the descendant of Othman (1402), and received tribute from the Greek emperor. The Ottoman Empire soon recovered from this blow, and Constantinople was taken and the Eastern Empire overthrown by the Sultan Mohammed II. in 1453. China recovered its independence about 1368 and was again subjected by the Manchu Tatars (1618–45), soon after which it began to extend its empire over Central Asia. Siberia was conquered by the Cossacks on behalf of Russia (1580–84). The same country effected a settlement in the Caucasus about 1786, and has since continued to make steady advances into Central Asia. The discovery by the Portuguese of the passage to India by the Cape of Good Hope led to their establishment on the coast of the peninsula (1498). They were speedily followed by the Spanish, Dutch, French, and British. The struggle between the two last powers for the supremacy of India was completed by the destruction of the French settlements (1760–65), and from that time the conquest of India by the British progressed with uninterrupted success. The extension of the influence and possessions of European powers, especially Russia, Britain, and France, has latterly been a most striking fact in Asiatic history, one result being the recent struggle between Russia and Japan.

ASIA MINOR, the most western portion of the great continent of Asia, bounded by the Black Sea on the north, by the river Euphrates on the east, and on the west by the Sea of Marmora, the Straits of the Hellespont and Bosporus, and the Grecian Archipelago, and south by the Mediterranean. It is about 1000 miles in length from east to west, and between 400 and 500 in breadth from north to south. The whole country is under the Turkish government, and is divided into the provinces of Karamania, Adana, Sivas, &c. See NATOLIA or ANATOLIA.

ASIATIC SOCIETIES, learned bodies instituted for the purpose of collecting and disseminating valuable information of every kind respecting the different countries of Asia. The Royal Asiatic Society of Great Britain and Ireland was established by Mr. Colebrooke, and opened March 19, 1823. At first it published Transactions, but since 1833 it has published The Journal of the Royal Asiatic Society instead, in which many very valuable papers have appeared. With it in 1828 was connected a very active translation committee, which publishes English, French, and Latin translations of oriental works, occasionally accompanied with the originals. The Society possesses a valuable library and museum. Similar societies have been formed in Asia itself, such as the Asiatic Society of Bengal at Calcutta. It was founded in 1784 by Sir William Jones, and between 1788 and 1836 published the celebrated Asiatic Researches (twenty vols.). Instead of the Researches the Journal of the Asiatic Society of Bengal is now published in monthly parts. Since 1846 the Bibliotheca Indica—a series of oriental works in text and translation—has been published under the supervision of this society at the expense of the Anglo-Indian government. There are similar societies on the Continent and in America, such as the Société Asiatique at Paris, founded in 1822, and the Oriental Society of Germany (Deutsche Morgenländische Gesellschaft), founded in 1845.

ASKEW, or ASCUE, ANNE, one of the most notable of the victims of religious persecution in the reign of Henry VIII. She was the second daughter of Sir William Askew of Kelsey, in Lincolnshire, and is described as a lady of great beauty and learning. At an early age she was married, much against her inclinations, to a wealthy neighbour named Kyme, who was as attached to the old religion as she was to the new. After bearing her husband two children he drove her from the house, or, according to another, she left him, assumed her maiden name, and went to London to procure a divorce. There she not only spoke boldly against transubstantiation and other dogmas of the old faith, but attempted to convert several ladies of the court, and was in correspondence with Queen Catherine Parr herself. She was soon arrested and led before Bonner, bishop of London, who induced her to sign a recantation, in which she professed to believe 'all manner of things contained in the Catholic Church,' and she was discharged from prison upon bail. Her enthusiasm, however, continued unabated, and she was again taken into custody, and examined before the privy-council. The council committed her to Newgate, and soon after she was condemned as a heretic to death at Guildhall. Some days later she was suddenly removed to the Tower, and the rack was applied in the presence, and it is said even by the hands, of Wriothesley the chancellor, who hoped to extort confession concerning those ladies of the court with whom she corresponded. Anne, however, continued firm, and would not make the desired confession, thereby saving the court ladies, and probably the queen. Before her frame had time to recover from the effects of the rack she was carried in a chair to Smithfield, chained to a stake, and along with four others was burned forthwith, all undergoing this cruel form of death with unshaken fortitude.

ASMANNSHAUSEN, a Prussian village on the Rhine, in the district of Wiesbaden, below Rüdesheim, celebrated for its wine, which is produced on a soil formed of blue slate. The red kind, the production of a small red Burgundy vine, is the more valuable. It retains its value only three or four years. After this time it grows worse every year, and precipitates the whole of its red colouring-matter. Many delicate judges of wine prefer the red sort to the best Burgundy. It is distinguished by colour and taste from all the other Rhenish wines.

ASMODAI, or ASMODEUS, in Hebrew mythology, an evil spirit which slew seven husbands of Sara, daughter of Raguel, at Rages. By the direction of the angel Raphael the young Tobias drove him away with the smell of a fish's liver burned on the coals into the uttermost parts of Egypt, where the angel bound him. Asmodai (or more correctly Aschmedai) signifies a desolater, a destroying angel; his name is also given as *Abaddon*.

ASMONÆANS, a family of high-priests and princes who ruled over the Jews for about 130 years, from 153 B.C. when Jonathan son of Mattathias was nominated to the high-priesthood by Alexander Balas of Syria. Mattathias was the great-grandson of Asmonæus, or Chasmon, a priest of the course of Jehoiarib (the first of David's twenty-four courses), and probably a descendant of Eleazer, son of Aaron. The history of the Asmonæan family is briefly recorded in the article JEWS.

ASOPUS, the name of several rivers in Greece. The most celebrated of this name are those in Achaia and Bœotia.

ASP, ASPIC (*Vipera haje*), a species of viper found in Egypt resembling the cobra da capello or spectacle serpent of the East Indies, except that the neck of the asp is not so capable of expansion, and its colour is greenish mingled with brown. This venomous serpent is found in the vicinity of the Nile, and has been celebrated for ages on account of the quick and easy death resulting from its bite. When approached or disturbed this viper, like the cobra da capello, elevates its head and body to a considerable degree, extends the sides of its neck, and appears to stand erect to attack the aggressor. This peculiarity gave origin to the ancient Egyptian superstition that the asps were guardians of the spots they inhabited, and led to the adoption of the figure of this reptile as an emblem of the protecting genius of the world. Hence on the portals of Egyptian temples it is common to see carved on each side of the globe one of these serpents in the attitude above described. The same device is also found among the paintings on the coffins of mummies, which also contain representations of the asp in various relations to other hieroglyphics. The peculiarity originating the preceding notion has led to the employment of the asp as a dancing serpent by the African jugglers. The asps for this purpose are carefully deprived of their fangs, which enables their owners to handle them with impunity. When they are to be exhibited the top of their cage, commonly a wicker basket, is taken off and at the same moment a flute or pipe is played. The asp immediately assumes the erect position, and the balancing motions made during its protracted efforts to maintain this attitude are what is called dancing. The asp is several times mentioned in the Bible. The 'deaf adder that stoppeth her ear' of Psalm lviii. 4, 5 is translated asp in the margin, and seems to have been this species. Cleopatra, according to the well-known and quite probable story, committed suicide by means of an asp's bite. The name asp is also given to a species of viper (*Vipera aspis*), which is found all over the continent of Europe and is common in many places. Its bite is severe, so much so as sometimes to cause death.

ASPARAGUS (*Asparagus officinalis*), a well-known plant, the young shoots of which are a favourite culinary vegetable. Few circumstances in the phenomena of vegetation are more remarkable than the gradual enlargement of size and improvement of quality which have taken place in the cultivation of asparagus. It grows wild on the pebbly

beach near Weymouth and in the island of Anglesea; but its stem in these situations is not usually thicker than a goose-quill and its whole height does not exceed a few inches, whereas in gardens its stem is sometimes nearly ¾ inch thick and its height when at maturity is 4 or 5 feet. Asparagus is one of the greatest delicacies which our kitchen-gardens afford, and it is particularly valuable from the early season at which it is produced. It is usually raised from seed in beds formed for the purpose; and the plants should remain three years in the ground before they are cut; after which, for several years, they will continue to afford a regular annual supply. During the winter they are secured from the effects of frost by the beds being covered some inches thick with straw or litter. In the cutting of asparagus the knife is passed 3 or 4 inches beneath the ground. The plants are cut by sloping the blade upward, and the white part that we see is that which had not previously been exposed to the air. The smallest plants are suffered to grow for the purpose of producing berries to restock the beds and keep them continually in a state of supply.

ASPASIA, a lady celebrated in ancient Greek history, was born at Miletus in Ionia, but passed a great part of her life at Athens. Her father's name was Axiochus. She devoted her attention to politics and eloquence. Plato mentions an elegant speech which she delivered in praise of the Athenians who fell at Lechæum; and she is asserted to have instructed Pericles in eloquence. Her house was the general resort of the most virtuous, learned, and distinguished men in Greece, and Socrates often favoured her with his company: he was even accused of having conceived a passion for her. She inspired the strongest and most enduring affection in the heart of Pericles, who had separated from his own wife and united himself to Aspasia as closely as was permitted by the Athenian law, which declared marriage with a foreign woman illegal. She is accused by Aristophanes of having been the cause of a war between the Athenians and Samians, on account of her native Miletus; and also of the Peloponnesian war between the Athenians and Lacedæmonians; but of course we cannot look for historical accuracy in the comic dramatist, and these charges may be dismissed as assigning to her too great an influence in the affairs of Greece. When the Athenians were dissatisfied with Pericles, instead of attacking him they persecuted the objects of his particular favour, and accused Aspasia, among others, of contempt of the gods. Pericles burst into tears in the midst of the Areopagus while advocating her cause, and it required all his influence to procure her acquittal. After his death (B. C. 429) Aspasia is said to have attached herself to a wealthy but obscure cattle-dealer, of the name of Lysicles, whom she soon made, however, an influential citizen in Athens. Nothing more is known of her life. She had a son by Pericles, who was legitimated by a special decree of the people. It may be said with safety that Aspasia had an important influence over the whole nation; for the men who sat at the helm of government were formed in her society.

ASPECT, in astronomy and astrology, denotes the situation of the planets and stars with respect to each other. There are five different aspects:—1, sextile aspect, when the planets or stars are 60° distant, and marked thus, ✱; 2, the quartile or quadrate, when they are 90° distant, marked □; 3, trine, when 120° distant, marked △; 4, opposition, when 180° distant, marked ☍; and 5, conjunction, when both are in the same degree, marked ☌. Kepler added eight more. It is to be observed that these aspects, being first introduced by astrologers, were distinguished into *benign, malignant,* and *indifferent;* and Kepler's definition of aspect, in consequence, is, 'Aspect is the angle formed by the rays of two stars meeting on the earth, whereby their good or bad influence is measured.'

ASPEN, or trembling poplar (*Populus tremula*), a species of poplar indigenous to Britain and to most mountainous regions throughout Europe and Asia. It is a beautiful tree, of a stately and elegant appearance, round headed and tall in proportion to its girth, of rapid growth and extremely hardy. It has nearly circular leaves, toothed and annular at the edges, smooth on both sides, and attached to footstalks so long and slender as to be shaken by the slightest wind. There is scarcely any situation in which the aspen will not flourish; but it succeeds best where the soil is moist and gravelly. Its wood is light, porous, soft, and of a white colour, and though inferior in excellence to that of the white poplar, is applicable to many useful purposes. It is used particularly for field-gates, milk-pails, clogs, packing-cases, and by wood-carvers. The charcoal made from this tree is used in the manufacture of gunpowder. The bark is used in tanning leather. In some countries the bark of the young trees is made into torches.

ASPERN AND ESSLINGEN (or ESSLING), two villages lying east of Vienna, and on the opposite bank of the Danube. They are celebrated for the battle fought, May 21 and 22, 1809, between the Archduke Charles and Napoleon I. After the fall of the capital the Austrian general resolved to suffer a part of the enemy's forces to pass the Danube, and then to surround them with his own army and drive them if possible into the river. Everything seemed to favour this plan; but it was frustrated by the energy of the French general and the extraordinary valour of his troops. The archduke had stationed himself behind Gerasdorf, between Bisamberg and Russbach, from which he issued with his army in five columns, consisting of 75,000 men, with 288 pieces of cannon, May 21, at noon, just as Napoleon, with about half his forces, had left the island of Lobau in the Danube. By a dexterous evolution of his troops he immediately formed a semicircle, in which the French army was in a manner inclosed. In the narrow plain between Aspern and Esslingen (they are about 2 miles distant from one another) a bloody engagement now commenced. Everything depended on the possession of these two villages: Aspern was at first taken by the Austrians, again lost and retaken, till they at length remained masters of it: from Esslingen they were continually repulsed. Napoleon repeatedly attempted to force the centre of the Austrians, but was frustrated by the firmness of their infantry. At last the darkness of the night put a temporary stop to the contest. The bridge connecting the right bank of the Danube with the island of Lobau had already been destroyed, so that the French reinforcements came up slowly, being compelled to sail over in small parties, and the whole corps of Davoust, on the right bank, were idle spectators of the battle. Notwithstanding these disadvantages the battle was renewed on the 22d; the French army being now increased so as at least to equal the Austrians in number. The engagement was of the same exterminating character as on the day before; thousands of lives were sacrificed in vain attempts to capture the villages. Aspern continued to be the stronghold of the Austrians and Esslingen of the French. When the army of Napoleon gave up all hopes of gaining the victory by forcing the centre of the Austrians, Esslingen served to secure their retreat to the island of Lobau, which was dis-

turbed only by the cannon of the archduke. The loss of the Austrians in killed, wounded, &c., was estimated at less than a third of the whole army; that of the French at half. The latter lost on this occasion Marshal Lannes. The Austrians had 4000 men killed and 16,000 wounded, the French 8000 killed and 30,000 wounded.

ASPHALT, or ASPHALTUM. See BITUMEN.

ASPHALTE or ASPHALT ROCK, is a limestone impregnated with bitumen, found in large quantities in various localities in Europe, as in the Val de Travers, in the canton of Neufchâtel, Switzerland; Seyssel, in the department of Ain in France; in Alsace, Hanover, Holstein, Sicily, &c. These rocks contain a variable quantity of bitumen (from 7 or 8 to 20 or 30 per cent.) naturally diffused through them, which renders them more valuable for paving and other purposes to which asphalt is applied than artificial preparations. The Val de Travers asphalte was discovered in 1712, and was applied to flooring, lining, and covering structures of wood or stone as a protection against decay. It fell into disuse until 1832, when it was again brought into notice. It has recently come into very prominent use as a paving material (see PAVEMENT), and other asphalt-rocks, as well as artificial preparations made by mixing bitumen, gas-tar, pitch, or other materials, with sand, chalk, &c., have been brought into competition with it. Asphalte of good quality forms a light, elastic, and durable pavement. The asphalte is formed into a pavement by various processes. It may, for instance, be broken into small pieces and heated in a cauldron till it becomes a soft homogeneous mass, after which it is spread on the roadway (a suitable bed having been prepared for it), and lastly compressed by a hot and then by a cold roller. It may also be applied as a hot powder and consolidated by the pressure of rollers as before. A common method is to put the powder into a cauldron along with some gravel and a small quantity of bitumen, and melt the whole together, the melted mass being then poured on the roadway and smoothed down. The greatest fault alleged against it is its slipperiness in wet weather, which renders it dangerous to horses, especially on a road which is not quite level.

ASPHALTITES, LAKE. See DEAD SEA.

ASPHODEL (*Asphodelus*), a genus of plants now reckoned among the natural order Liliaceæ, although Endlicher made it the type of a separate order, to which he gave the name of Asphodeleæ. The members of the genus are perennial plants, with fasciculated fleshy roots, flowers arranged in racemes, six stamens inserted at the base of the perianth, a sessile almost spherical ovary with two cells, each containing two ovules. The fruit is a capsule with three cells, in each of which there are, as a rule, two seeds. The *Asphodelus ramosus*, which attains a height of 5 feet, grows abundantly in all the parts of Europe bordering on the Mediterranean, in the north of Africa, and the Canary Islands. It is now largely cultivated for industrial purposes, principally in Algeria. Its tubercles yield a very pure alcohol, and the residue of them, together with the stalks and leaves, are used in making pasteboard and paper. Two species are cultivated in this country as garden flowers, the yellow asphodel (*Asphodelus luteus*) and the white asphodel (*Asphodelus albus*). The asphodel was a favourite plant among the ancients, who were in the habit of planting it round their tombs. Lucian says that the manes, after crossing the Styx, descend into an extensive plain covered with asphodels, and Homer states that Ulysses saw a plain of this sort when he descended to the infernal regions. The word daffodil is a corruption of asphodel, but is applied to different plants, namely, to those species of narcissus which have a large bell-shaped corona, especially the *Narcissus pseudo-narcissus*.

ASPHYXIA (from Greek *a*, not, and *sphyxis*, the pulse), the state of a living animal in which no pulsation can be perceived. It begins with an inactivity of the lungs, which proceeds to the heart and brain. The sufferer appears dead, without breath, pulsation, or feeling. It may be occasioned by different causes, either such as interrupt the mechanical motion of breathing, or such as disturb the action of the lungs themselves. The former may be caused by an external pressure on the breast, if air enters the thorax through wounds, or by an accumulation of blood in the lungs, so that they cannot contract themselves; the latter stage takes place if no air at all enters the lungs, as is the case with suffocated, drowned, or hanged persons, or if the air breathed in cannot support life. For the treatment of persons apparently drowned see DROWNING. If apparently dead from intense cold, rub the body over with snow, ice, or cold water. Restore warmth by slow degrees; and after some time, if necessary, employ the means recommended for the drowned. If apparently dead from hanging, in addition to the means recommended for the drowned bleeding should early be employed by a medical assistant. If apparently dead from noxious vapours, &c., remove the body into a cool fresh air. Dash cold water on the neck, face, and breast frequently. Use the means for inflating the lungs recommended in the case of the apparently drowned. Let electricity (particularly in accidents from lightning) be early employed by a medical assistant. If apparently dead from intoxication, lay the body on a bed with the head raised, remove the neckcloth, and loosen the clothes. Obtain instantly medical assistance, as the treatment must be regulated by the state of the patient; but in the meantime apply cloths soaked in cold water to the head, and bottles of hot water or hot bricks to the calves of the legs and to the feet. It is of the utmost importance to keep up the heat of the body, by means of warmth applied externally, whilst restorative measures are being adopted.

ASPIDISTRA, a genus of plants of the lily family, natives of China and Japan, now much cultivated as indoor foliage plants on account of their large, smooth, green leaves.

ASPINWALL. See COLON.

ASPIRATE or SPIRITUS ASPER, in grammar, an accent peculiar to the Greek language, marked thus (ʽ), and importing that the letter over which it is placed ought to be strongly aspirated, that is, pronounced as if an *h* were prefixed.

ASPIRATOR, an instrument used to promote the flow of a gas from one vessel into another by means of a liquid. The simplest form of aspirator is a cylindrical vessel with a pipe at the upper end which communicates with the vessel containing the gas, and a pipe at the lower end also, with a stopcock, and with its extremity bent up. By allowing a portion of the water to run off by the pipe at the lower part of the aspirator a measured quantity of air or other gas is sucked into the upper part.

ASPIRIN, a drug of recent introduction and owing its properties mainly to salicylic acid. It is administered in rheumatic and nervous affections, gout, &c. It hardly begins to act till it has passed through the stomach, and scarcely affects the appetite.

ASQUITH, HERBERT HENRY, statesman, was born at Morley, near Leeds, on Sept. 12, 1852. After receiving his earlier education at the City of London School, he proceeded to Balliol College, Oxford, where he had a very distinguished career. He graduated in 1874 with a first class in classics, won the Craven University Scholarship, and became a

fellow of his college. Called to the Bar at Lincoln's Inn in 1876, he soon built up a very extensive practice, and in 1889 he was associated with the late Lord Russell of Killowen, then Sir Charles Russell, in the defence of Mr. Parnell before the Parnell Commission. In the following year, 1890, he was called within the Bar. His political career began in 1886 with his election to the House of Commons as representative, in the Liberal interest, of East Fife, a constituency for which he has sat continuously till the present. As Home Secretary in the Liberal administration of 1892–95 he was very successful, and he has since been one of the leading men in the Liberal party. He supported the South African War, and on the formation of the Liberal League by Lord Rosebery, in 1902, he became a vice-president. During the fiscal controversy raised by Mr. Chamberlain Mr. Asquith was perhaps the most effective public speaker on the Free Trade side. He joined Sir Henry Campbell-Bannerman's government in 1905 as Chancellor of the Exchequer, and succeeded him as Premier in 1908, and still holds this position after the two general elections of 1910. He was elected Lord Rector of Glasgow University in 1905, of Edinburgh University in 1908. He is D.C.L. of Oxford, LL.D. of Edinburgh, &c.

ASRAEL, in the Mohammedan mythology, the angel who watches the souls of the dying.

ASS (*Equus asinus*), a well-known and valuable species of the horse genus. The true asses are closely related both to the zebras and to the horses proper, especially to the former; but from the zebras they are distinguished chiefly by the absence of the numerous transverse stripes, and they have larger heads, longer ears, shorter legs, smaller and less flowing manes, and less hairy tails than the horses. Several species of wild ass are known, natives of the region extending from north-eastern Africa to India. The African species (*Equus taeniopus* or *asinus*) is distinguished from its Asiatic relations by its longer ears, shorter mane, and less hairy tail. It is also the largest of the wild varieties, reaching a height of fourteen hands (4 feet 8 inches) at the withers. It is of a creamy-gray colour, slightly tinged with rufous, and has the under-parts, the muzzle, and often parts of the legs, white. Like all the wild asses it has a brown stripe extending along the back from the mane to the tail, and there is almost always a similar stripe across the shoulders; the legs, too, not infrequently have dark rings round them. This species is very common in Abyssinia and the neighbouring countries, and Sir Samuel Baker speaks of them as very fleet, courageous, and sure-footed animals, with a nobility of deportment entirely foreign to the domestic ass of Britain. They are found both in the Abyssinian highlands and on the arid plains of the Soudan, and their colour, as Sir S. Baker remarks, closely resembles that of the sand over which they roam. Their food consists of the wiry herbage found in those countries, and their flesh is eaten by the Arabs. They never collect in large herds, and their cry is like the bray of the domestic variety. Naturalists are not agreed as to the arrangement of the Asiatic wild asses in species, some regarding them as varieties of one species (*E. hemionus*) whilst others enumerate five or six specific types. The *dziggetai* (*E. hemionus*), the *kulan* (*E. onager*), and the *kiang* (*E. kiang*) are now generally regarded as the same animal. It is found in Tibet and Mongolia, and in many respects shows a considerable approach to the horse. Its colour is usually more reddish than that of the African species just described, the dorsal stripe is narrower, the tail somewhat longer, and the ears smaller. The shoulder and leg stripes are not so often found in this species. They are usually found in small herds on desert plains or open table-lands, and they feed on various grasses and undershrubs. They are fleet of foot and extremely inquisitive, and their cry shows some approach to a horse's neigh. There can be little doubt that the domestic ass is descended from the African wild ass. Its colour is usually gray, but it may vary to almost pure white or dark brown, and dappled and pied varieties are found. It has the dark dorsal stripe, which is distinctly visible in the lighter kinds, but the transverse shoulder stripe is often wanting; the leg-bands are seldom found in adults, but they are often seen in foals. It was probably one of the earliest domesticated animals, and was used by the Egyptians from the times of the earliest monuments, whereas the less easily tamable horse does not seem to have been employed at so early a date. In many countries, however, including Britain, long-continued neglect and ill-usage have resulted in the production of diminutive varieties, lacking the nobility and fleetness of the wild forms, and now usually associated with stupidity and obstinacy. In Spain, Italy, and other parts of the south of Europe, as well as in some of the United States, great care in breeding has produced fine varieties, some of them reaching a height of 15 or 16 hands (5 feet to 5 feet 4 inches). The ass is content with a smaller quantity of food, and that of a coarser quality, than the horse, and it does not require so much water; it is thus well adapted for work in hilly and arid regions. It is kept not only as a beast of draught and burden, but also on account of its milk, which more closely resembles that of woman than any other. The milk is very nutritive and easily digested, and is thus of great value to persons suffering from debility of the digestive or assimilative functions. Consumptives also frequently derive much benefit from its use. The maximum age of the ass is about thirty years. The skin of the ass is hard and elastic, and is used as parchment for covering drums, &c.; it is also made into *shagreen*. The domestic ass shows some curious traits inherited from its desert-roaming ancestors, particularly in its reluctance to cross water. In general intelligence it is quite equal, if not superior, to the horse. See MULE.

ASSAI-PALM (*Euterpe edulis*), a tall and slender tree, only about 4 inches in diameter and some 30 or 40 feet high, with a crown of leaves, beneath which a small sloe-like fruit grows on branched horizontal spadices. The pulp of the fruit mixed with water is used as a beverage in Northern Brazil, the palm being a native of tropical South America.

ASSAM, a portion of British India, now united with Eastern Bengal to form the lieutenant-governorship of Eastern Bengal and Assam. It lies on the north-east of the peninsula, and mainly between Upper Burma and the Himalayas; area, 56,000 square miles. Assam may be considered as a long series of fertile valleys watered by the Brahmaputra and its tributaries. The valley of the Brahmaputra consists of rich alluvial plains, comprising the deposits of ages as washed from the Himalayas on the north, and the Garo, Khasia and Jaintia, and Naga Hills to the south. These alluvial plains are either but little elevated above the flood-level of the Brahmaputra and its feeders, or so low that large extents of them are flooded for three or four days once or twice in the year. Large areas are annually washed away through the Brahmaputra changing its course, the soil accumulating again in different localities. The Surma valley (next in importance) is a shallow basin which is being filled up by the silt washed down by the heavy rains, and includes the whole district of Sylhet. The whole province, except the cultivated area, may be designated as forest, if the grass lands

with scattered trees be included in that term. Here are found the valuable teak and sissoo trees, date and sago palms, the areca palm (the betelnut-tree), the Indian fig-tree, &c. The mulberry is cultivated in small patches; two kinds of silk-worms are reared, and a fine white silk is produced. But the article of most commercial importance grown in Assam is tea. The plant was discovered growing in this region in 1823, but it was not till 1838 that the first shipment (twelve chests) reached England. The plant producing it, though not regarded as specifically distinct from that of China, is much larger and more vigorous. There are now about 340,000 acres under tea; the yield is about 120,000,000 lbs. annually. Rice covers a large extent of the cultivated soil, occupying about 1,500,000 acres. The other crops include maize, pulse, oil-seeds, sugar-cane, hemp, jute, potatoes, &c. In the jungles and forests roam herds of elephants, the right to capture which is reserved as the government prerogative, leased out annually; in the dense and swampy parts of the forests the rhinoceros is met with, and tigers and wild buffaloes abound; leopards, bears, and wild hogs are numerous, and among other animals are jackals and foxes, goats, deer, and the venomous cobra, many human lives being lost through its bite. Pheasants, partridges, snipe, wild peacock, and water-fowl of every description tempt the sportsman. Coal, petroleum, limestone, and iron are found, and gold-dust is met with in many of the rivers. The coal-beds are supposed to be coextensive with the main valley, but coal is only worked to the south of the Brahmaputra. The inhabitants are mostly engaged in agriculture. There is no Assamese nation proper, various ethnical groups being represented. The people seem to be contented, good-natured, and indolent, and have few wants beyond what can be easily supplied from their fertile and lightly rented fields. The women are handsome, and their habits are essentially domestic. Great respect is paid to the aged; parents, when no longer able to work, are supported by their offspring; they are tenderly attached to their children, kind to their relatives, and hospitable to people of their own caste. The hill tribes, formerly warlike and predatory, and often at war among each other, are not even yet entirely converted into peaceful cultivators of the soil. About 3,000,000 of the inhabitants are Hindus, nearly 1,500,000 Mohammedans, 17,000 Christians, 8000 Buddhists, 1,000,000 animistic. The labourers in the tea-gardens are mostly drawn from the western districts of Lower Bengal. Assam, known in ancient Indian history as Kâmarûpa, formed in the seventh century A.D. a powerful independent kingdom under a Brahman sovereign, but in the fifteenth century it broke up into twelve separate states, which, in spite of their numerous internal struggles, were generally able to resist the attacks of the powerful Mogul emperors. Late in the eighteenth century its condition encouraged the Burmese to make the country a dependency of Ava, but the Burmese encroachments on the territory of the East India Company brought about war with the British. In 1826 Assam became a possession of Britain under the administration of the lieutenant-governor of Bengal, and in 1874 it was erected into a chief-commissionership. The lieutenant-governorship of Eastern Bengal and Assam was formed in 1905; capital Dacca, in E. Bengal. There are no towns properly so called in Assam itself. Pop. (1891), 5,476,833; (1901), 6,122,201.

ASSASSINS. See ISHMAELITES.

ASSAULT, in law, an attempt or offer, with force and violence, to do a bodily injury to another, as by striking at him with or without a weapon. *Battery*, a term usually associated with assault, is when violence is actually used, and thus in an action for assault and battery a man may be found guilty of the assault and acquitted of the battery. But every battery includes an assault. If a person in anger lift up or stretch forth his arm and offer to strike another, or menace any one with any staff or weapon, it is an assault in law; and if a man threaten to beat another person, or lie in wait to do so, if the other is hindered in his business, and receive loss thereby, an action lies for the injury. Any injury, however small, actually done to the person of a man in an angry or revengeful, or rude or insolent manner, as by spitting in his face, throwing water over him, or any way touching him in anger, or violently jostling him, is a battery in the eye of the law. If any officer, having a warrant against one who will not suffer himself to be arrested, beat or wound him in the attempt to take him, he may justify it; so if a parent in a reasonable manner chastise his child, or a schoolmaster his scholar, or even a husband his wife (for reasonable and proper cause)—in all these cases it seems the party may justify the assault and battery. Several kinds of assault are treated as of an aggravated character; as indecent assault, assault on a public official in the performance of his duty, assault causing severe bodily harm, &c. The punishment of an assault may thus vary greatly, and in the worst cases, as in shooting or administering poison, may amount to penal servitude for life. In an action for damages grounded on assault the damages are awarded at the discretion of a jury.

ASSAYE, a village in Southern India, in Haidarabad, where Wellington (then Major-general Wellesley) gained a famous victory in 1803. After the capture of Ahmednagar, in his campaign against Scindia (see WELLINGTON), Wellesley crossed the Godavery, and arrived at Aurungabad. Scindia and the Rajah of Berar appearing disposed to counter his movement by crossing the Godavery to the south and attacking Haidarabad, Wellesley followed them closely and compelled them to retreat to the north of Jalnapur, which was taken by Colonel Stevenson. On 21st September the Mahratta army encamped in the neighbourhood of Jafferabad, while Wellesley and Stevenson formed a junction at Budnapur. The British moved in two divisons to attack the enemy. On the 23rd Wellesley learned that they were within 6 miles of him on the banks of the Kailna. He determined at once to attack them with his own division. They were found extended along the north bank of the river within the fork formed by its junction with the Juah, their right towards the village of Bokerdun, consisting wholly of cavalry, and their left, consisting of infantry and artillery, resting on the fortified village of Assaye. The British arrived on the south of the Kailna, in front of the enemy's right. In order to attack the infantry and artillery Wellesley moved to the east, and forded the river beyond the enemy's left, just in the angle of the fork. He drew up his infantry in two lines, with the cavalry in reserve. The Mahrattas now changed their position, stretching their line north to south between the rivers to meet the British advance. The British charged with the bayonet, and carried two lines of the enemy's defence with ease. But as both infantry and cavalry were in pursuit, the latter having crossed the Juah to follow the enemy, who fled to the northern bank, many of the Mahrattas who had thrown themselves down among their guns rose and turned them on the British rear. The enemy, in front of whom several corps were still in good order, rallied and turned on the pursuers. Wellesley turned with two regiments on the Mahrattas in rear, and after a bloody

contest succeeded in securing the guns. This completed the victory, but the heavy loss of the victors (1566—more than a third of their entire number) prevented full advantage from being taken of it. The Mahrattas left 1200 dead on the field, and their wounded were numerous. Seven standards, ninety-eight pieces of ordnance, the camp equipage, and large military stores, were taken. The Mahrattas, who had sixteen battalions of regular infantry and nearly 40,000 horse, were led by French officers.

ASSAYING, or ESSAYING, was the term formerly used for the general chemical analysis of mineral bodies. It is now usually restricted to the estimation of gold and silver. The alloys of these metals for coinage have to be made up to the proper standard, but as they are rarely quite uniform, being richer in the precious metal in one part than another, they are tested or assayed before they are used. In the case of silver the assay is either by the dry or by the wet process. The dry process is called *cupellation*, and is one of the most ancient of chemico-metallurgical operations. A small cup, called a *cupel*, is formed by making well-burned and finely-ground bone-ash into a paste with water, and compressing it within a metal ring by a pestle which fits it. The cupel is thoroughly dried, and if it is sound is placed in a fire-clay oven about the size of a drain-tile, with a flat sole and arched roof, and with slits at the sides to admit air. This oven, called a *muffle*, is set in a furnace, and when it is at a red heat the assay, consisting of a weighed portion of the alloy wrapped in sheet-lead, is laid upon the cupel. The lead melts and oxidizes, gives up oxygen to the inferior metals in the alloy, and the excess of lead oxide, fusing, dissolves the oxides of the other metals, and sinks with them into the cupel. The operation is continued until the whole of the lead has disappeared and a bright globule of pure metallic silver is left upon the cupel, and this, when cleaned and weighed, gives the amount of silver in the alloy operated on. In the wet process the alloy is dissolved in nitric acid, and to the solution are added measured quantities of a solution of common salt of known strength. After each addition the fluid, contained in a small bottle, is shaken in a spring frame-work to cause the chloride of silver to clot together. The operation is concluded when no further precipitate is obtained on the addition of the salt solution. The quantity of silver is calculated from the amount of salt solution used. An alloy of gold is first cupelled with lead as above, with the addition of three parts of silver for every one of gold. After the cupellation is finished the alloy of gold and silver is beaten and rolled out into a thin plate, which is curled up by the fingers into a little spiral or *cornet*. This is put into a flask with nitric acid, which dissolves away the silver and leaves the cornet dark and brittle. After washing with water the cornet is boiled with stronger nitric acid to remove the last traces of silver, well washed, and then allowed to drop into a small crucible, in which it is heated, and then it is weighed. The assay of gold, therefore, consists of two parts—*cupellation*, by which inferior metals (except silver) are removed; and *quartation*, by which the added silver and any silver originally present are got rid of. The quantity of silver added has to be regulated to about three times that of the gold. If it be more the cornet breaks up, if it be less the gold protects small quantities of the silver from the action of the acid.

ASSEMBLY, GENERAL, the name of the supreme ecclesiastical court of the Established Church of Scotland. It consists of delegates from every presbytery, university, and royal burgh in Scotland. It has the countenance of a representative of the king, styled the lord high commissioner, who is always a nobleman; and holding its meetings annually, and (according to the present practice) in the month of May, it usually continues to sit for twelve days. In its judicial capacity as a court of review, and as the court of last resort, the General Assembly has a right to determine finally every question brought from the inferior courts, by reference, complaint, or appeal. And it possesses besides such a general superintendence of the discipline of the church, of the management of the inferior courts, of the conduct of the clergy, and of the morals of the people, that it has authority to go beyond the record in any particular case to redress a wrong which appears to have been done, or to apply the church discipline, which has either been neglected by the inferior courts or which the circumstances of the case appear to require. But to do this regularly the parties interested must be legally cited, if they were not before at the bar. In these general views of its judicative capacity the authority vested in the General Assembly is of equal importance to the prosperity of the church, to the permanent interests of religion, and to the usefulness and respectability of the clergy. The legislative authority of the General Assembly has as extensive effects as its judicial functions. It has the power of enacting statutes with regard to every subject of ecclesiastical cognizance; which are equally binding as permanent laws on the Assembly itself, on the inferior courts, and on the individual members of the church. But the power of legislation is not committed to the General Assembly without limitation. By an act of Assembly in 1697 (which was not passed into a law till it had been transmitted to the several presbyteries, and had received their sanction, and which, from its substance and design, has obtained the name of the Barrier Act) every proposition for a new law must first be considered in the form of an overture, either originating in the Assembly itself, or suggested to the Assembly by the inferior judicatures. Though it should be approved of by the Assembly it cannot be enacted into a statute till it has been first transmitted to the several presbyteries of the church for their consideration, and has received the sanction of at least a majority of the presbyteries. The laws which are enacted by the Assembly, after receiving this sanction, are the established and permanent statutes of the church, by which everything belonging to the ecclesiastical state, or to the church courts, is authoritatively regulated. See SCOTLAND—Church. The United Free Church of Scotland has a General Assembly similar in its constitution and functions to that of the Established Church, and the same is the case with the Presbyterian churches of Ireland and America.

ASSEMBLY OF DIVINES. See WESTMINSTER ASSEMBLY.

ASSENT, THE ROYAL, is the approbation given by the sovereign in Parliament to a bill which has passed both houses, after which it becomes a law. See PARLIAMENT.

ASSER, JOHN, or ASSERIUS MENEVENSIS, that is, Asser of St. David's, a learned British ecclesiastic, distinguished as the instructor, companion, and biographer of Alfred the Great. He was appointed abbot by Alfred of two or three different monasteries, and at last promoted to the episcopal see of Sherborne, where he died in 908 or 910. He wrote the life of Alfred (Annales Rerum Gestarum Ælfredi Magni), which was first published at the end of Parker's edition of Walsingham's History (London, 1574), and afterwards in Camden's Historical Collection (at Frankfort). A separate edition was published at Oxford in 1722. There is an English translation in Bohn's Antiquarian Library.

ASSESSED TAXES are taxes charged upon persons in respect of commodities in their use or keeping, as houses, servants, carriages, dogs, armorial bearings, &c. Assessed taxes are levied by the excise officers and classified under excise. See EXCISE.

ASSESSOR, in English law, a person appointed to ascertain and fix the value of taxes, rates, &c. By section 55 of the Judicature Act, 1873, the High Court, or the Court of Appeal, when it may think expedient, may call in the aid of specially qualified assessors, and may hear and try the case before it wholly or partially with their assistance. In Scottish law a person who sits along with the judges in the inferior courts in Scotland, and with his professional knowledge assists in the decisions pronounced, is called an assessor.

ASSETS (French, *assez*, that is, *ad satis*, enough), goods enough to discharge the burden which is cast upon the executor or heir by satisfying the debts and legacies of the testator or ancestor. Assets are real or personal. Where a man holds lands in fee-simple, and dies possessed thereof, the lands which come to his heirs are assets real; and when he dies possessed of any personal estate, the goods which come to the executors are assets personal. In commerce and bankruptcy the term is often used to designate the stock in trade and entire property of an individual or an association.

ASSIENTO (Spanish for treaty), the permission of the Spanish government to a foreign nation to import negro slaves from Africa into the Spanish colonies in America, for a limited time, on payment of certain duties. Philip IV. and Charles II. concluded a treaty of this sort with the people of England and Holland. The English were the sole possessors of this assiento till 1701. They lost it when Philip V. of Anjou ascended the throne of Spain; but in 1702 the French Guinea Company, who afterwards assumed the title of the Assiento Company, became possessed of this privilege for ten years, within which period they were permitted to import yearly 4800 slaves, of both sexes, into the mainland and islands of Spanish America. In 1713 the celebrated assiento treaty with Britain for thirty years was concluded at Utrecht (Great Britain afterwards gave up the trade to the South Sea Company). By this contract the British, among other privileges, obtained the right of sending a *permission* or *assiento ship*, so called, of 500 tons every year, with all sorts of merchandise, to the Spanish colonies. This led to frequent abuses and contraband trade; acts of violence followed, and in 1739 a war broke out between the two powers. At the peace of Aix-la-Chapelle, in 1748, four years more were granted to the British; but in the treaty of Madrid, two years later, £100,000 sterling were promised for the relinquishment of the two remaining years, and the contract was annulled.

ASSIGNAT, the name of the national paper currency in the time of the French revolution. Assignats to the value of four hundred million francs were first struck off by the Constituent Assembly, with the approbation of the king, April 19, 1790, to be redeemed with the proceeds of the sale of the confiscated goods of the church. August 27th of the same year, Mirabeau urged the issuing of 2,000,000,000 francs of new assignats, which caused a dispute in the assembly. Vergasse and Dupont particularly distinguished themselves as the opponents of Mirabeau. They saw that the plan was an invention of Clavière (of whose work the speech of Mirabeau was only an extract) to enrich himself and his adherents; that it would tend to put the rich usurers in possession of the wealth of the nation, which would be insufficient to redeem the assignats, particularly if they were increased. Among other arguments Mirabeau maintained the expediency of the measure he proposed on the ground that the holders of assignats would necessarily support the new constitution, which was the only guarantee for the redemption of the assignats. His exertions were seconded by Péthion, and 800,000,000 francs more were issued. They were increased by degrees to 45,578,000,000, and soon began to decline in value very rapidly. In the winter of 1792–93 they lost 30 per cent., and in spite of the law which compelled acceptance of the assignats at their nominal value, a silver franc was in June worth three paper francs, and in August worth six. This depreciation was due partly to the want of confidence in the stability of the government, partly to the fact that the coarsely-executed and easily counterfeited assignats were forged in great numbers. At last in the spring of 1796 they fell to one three hundred and forty-fourth of their nominal value, and they were withdrawn by the Directory from the currency, and were redeemed by mandats at one-thirtieth of their nominal value. See MANDATS.

ASSIGNEE, a person appointed by another to transact some business, or exercise some particular privilege or power. The term is most commonly applied to the creditor of a bankrupt appointed to manage for the rest of the creditors, and who has the bankrupt's estate assigned over to him.

ASSIGNMENT is a transfer by deed of any property, or right, title, or interest in property, real or personal. The operative words of a legal transfer are, 'assign transfer and set over;' but other words may be used if their meaning is unmistakable. An office of trust or a trusteeship, a thing in action, or a cause at law, cannot be assigned. Assignments are usually given for leases, mortgages, and funded property.

ASSINIBOIA, a district of Central Canada, west of Manitoba, formerly constituting one of the North-west Territories, now mostly included in the province of Saskatchewan, constituted in 1905, of which it forms the southern part. It contains much good wheat land.

ASSINIBOINE, a river of Canada, which flows through Saskatchewan and Manitoba, and enters the Red River, after a somewhat circuitous course of about 500 miles from the west and north-west, at about 40 miles from Lake Winnipeg. Winnipeg is at the junction of the Red River and Assiniboine.

ASSISI, a small town in Italy, in the province of Umbria, 20 miles from Spoleto, on a hill in one of the most charming parts of Italy. It is the see of a bishop. It is famous as the birth-place of St. Francis d'Assisi, and for the splendid church built over the chapel where St. Francis received his first impulse to devotion. This church is one of the finest remains of the architecture of the middle ages in the Gothic style. Pop. (1901), 7100.

ASSIZES, a term used in England to signify the sessions of the courts held at intervals in every county by the judges. The whole country is divided into *circuits* as they are called (eight in number at present), each embracing so many counties, and three times in the year (formerly twice) two judges, who are members of the highest courts in England, hold assizes in all the counties of their respective circuit. In London and Middlesex, instead of circuits, what are known as courts of *nisi prius* are held. At the assizes all the justices of the peace of the county are bound to attend, or else are liable to a fine; and also all the persons who have been summoned as grand jurymen or petit jurymen by the sheriff. At these assizes the judges sit under five separate commissions, some of which relate to civil and some to criminal causes or business. The first is the commission of *assize*,

from which the session derives its name, by which they are authorized to take assizes in the several counties, that is, to take the verdict of a peculiar sort of jury called an *assize*, and summoned to decide certain cases respecting the titles to land. This class of causes is now obsolete, the trial of such land titles being now had in other and more modern forms of action. 2. The commission of *nisi prius*, as it is called, which empowers them to try all questions or issues of fact, issuing out of a division of the High Court of Justice, and which must be tried by a jury from that county wherein the cause of action arises. These issues used to be, strictly, triable in the courts at Westminster by a jury returned there from the county. But there was a proviso, *nisi prius*, 'unless before,' the term assigned for trial at Westminster, the judges of assize came (as they were sure to do) into the county in question, and then the commission authorized such trial by the judges of assize. By an enactment passed in 1852, however, the proviso of *nisi prius* is no longer required in the procedure, and the trial takes place as a matter of course at the assizes. These commissions are of a civil nature, but the judges of assize have also, by virtue of several statutes, a criminal jurisdiction in certain special cases. 3. The commission of *oyer and terminer*, to hear and determine all treasons, felonies, and misdemeanours committed within the county. By virtue of this commission they can proceed only upon an indictment found at the same assizes by the grand-jury. 4. On this account they have another commission of *general jail delivery*, which empowers them to try and deliver every prisoner who shall be in jail when the judges arrive at the circuit town, whenever or before whomsoever indicted, or for whatever crime committed. 5. The commission of the *peace*, by which they are empowered to do all things necessary or proper, according to the English laws, to preserve public tranquillity, to suppress crimes, and to arrest offenders. In this manner, and by these means, the jails are in general cleared, and offenders tried and convicted or acquitted at least every half year. In America there are no courts or sessions of courts which are technically called assizes. The judges, however, perform the same duties in the counties, within their respective circuits and jurisdictions, as the English judges, and generally in the same manner, that is to say, according to the course of the common law. Since 1808 there have been assize courts in the judicial system in France. With the English institutions, however, they have scarcely anything in common but the name. In the law of Scotland assize is the technical term applied in cases tried in the court of justiciary to the jury of fifteen sworn men, selected by ballot from a greater number not exceeding forty-five.

ASSOCIATION OF IDEAS. See MEMORY.

ASSONANCE, in poetry, a term used when the terminating words of lines have the same vowel-sound but make no proper rhyme. Such verses having what we should consider false rhymes are regularly employed in Spanish poetry; as in *ligera, cubierta, tierra, mesa.*

ASSOUAN. See ESSOUAN.

ASSUMPSIT, in English law, was an action to recover a compensation in damages for the non-performance of a simple contract; that is, a promise, whether verbal or written, not contained in a deed under seal. The word *assumpsit* (Latin) means, he undertook, and was taken as the name of this action from its occurrence in declarations, that is, formal statements of the plaintiff's cause of action, when these were in Latin. Assumpsits were of two kinds, *express* and *implied*; the former being where the contracts were actually made in word or writing; the latter being such as the law implies from the justice of the case; as, for instance, if I employ an artificer to do any work for me, the obvious justice of my paying him a reasonable sum for that work, when done, raises an implication, in the understanding of the law, of a promise on my part to pay him.

ASSUMPTION is the festival by which the Roman and Greek Catholic Churches celebrate the miraculous ascent of the Virgin on the 15th of August. One of Raphael's earlier pictures represents the empty coffin in which, according to the Catholic tradition, flowers were found after Mary had ascended to heaven. The picture is now in the Vatican.

ASSUMPTION, a city in Paraguay. See ASUNCION.

ASSURANCE. See INSURANCE.

ASSYNT, an extensive parish in Sutherlandshire, with an estimated area of 100,000 acres; one of the wildest and most rugged districts of Scotland. Some of its mountains are of considerable elevation and of peculiar form. The loftiest, Ben More, rises to the height of 3230 feet. Limestone is abundant, and there are inexhaustible quarries of beautiful marble both white and variegated in colour, and capable of receiving the finest polish. Fresh-water lakes are numerous; the largest, Loch Assynt, is about 7 miles in length and 1 in breadth. On a peninsula jutting into this lake are the ruins of the ancient castle of Ardvrach, where the Marquis of Montrose was confined by Macleod of Assynt. A large portion of the parish is laid out in sheep-walks, only a small part being arable.

ASSYRIA (the *Asshur* of the Hebrews, *Athurâ* of the ancient Persians), the ancient name of a great and powerful country lying mainly between the Euphrates and the Tigris, the seat of the earliest recorded monarchy. Its boundaries differed greatly in different stages of its history. In the earliest times it was probably limited to the low-lying tract between the Jebel Makloub and the little Zab (Zab-Asfal), lying mainly on the left bank of the Tigris. The frontiers were gradually extended until they touched the Armenian mountains on the north, the lofty range of Zagros (mountains of Kurdistan) on the east, the Mesopotamian desert, or according to others the Euphrates, on the west, and the country round Bagdad on the south. Taken at its greatest extent Assyria must have been nearly 500 miles long, having a breadth varying from 350 to 100 miles, and an area of about 100,000 square miles. Towards the north Assyria bordered on the mountainous country of Armenia, which may at times have been under Assyrian dominion, but which at no time was considered as an actual part of the country. On the east dwelt numerous independent and warlike tribes, sheltered by the fastnesses of the Zagros Mountains. Beyond these tribes lay Media, which eventually subjugated the mountaineers, thus bringing itself into immediate contact with Assyria in that quarter. On the south Susiana or Elam was the frontier state east of the Tigris, while Babylonia occupied the same position between the rivers. West of Assyria lay Arabia, and higher up Syria and the land of the Hittites. The chief cities of Assyria in the days of its greatest prosperity were Nineveh, the site of which is marked by the mounds opposite Mosul (Nebi Yunus and Koyunjik), Calah or Kalakh (the modern Nimrud), Asshur or Al Asur (Kalah Sherghat), Sargina (Khorsabad), Arbela (Arbil), &c. The surface of the country within its widest limits was of a diversified character. On the north and east the lofty mountain-ranges of Armenia and Kurdistan are succeeded by low ranges of arid limestone hills, occasionally inclosing fertile plains and valleys. Im-

mediately south of this is a well-watered, productive, and undulating belt of country, into which run limestone rocks of a golden colour and wooded with dwarf-oak. This hilly track sinks suddenly down upon the great Mesopotamian plain (the modern El Jezireh), about 250 miles in length, interrupted only by a single limestone range rising suddenly out of the plain and branching off from the Zagros Mountains. The numerous remains of ancient habitations show how thickly this vast flat must have once been peopled; now, for the most part, it is a mere wilderness.

History.—Scripture tells us that the early inhabitants of Assyria went from Babylon, and the traditions of later times, as well as inscriptions on the disinterred Assyrian monuments, and the character of those remains, go to show that the power and civilization of Babylon were earlier than those of Assyria. In Gen. x. 11 it is mentioned that Nineveh was founded by Asshur, but for long the country was subject to governors appointed by the kings of Babylon. We learn from monumental inscriptions that about 1820 B.C., when Asshur was the capital of the country, Samsi-vul founded temples there to Asshur, the great national deity, and to Anu and Vul, besides a temple to the goddess of Nineveh in the city of that name. The Assyrian rulers gradually began to treat with their southern neighbours on equal terms, the boundaries of the two countries were for a time clearly marked out, and intermarriages among the reigning families occasionally took place. About the latter end of the fourteenth century Shalmaneser acquired the whole of Naharain (the country round the sources of the Euphrates and Tigris) by conquest, and planted Assyrian colonies there; he also founded the city of Kalakh or Calah, and restored the great temple at Nineveh. About 1300 B.C. he was succeeded by his son Tiglath-ninip, who conquered the whole of the valley of the Euphrates, and built or restored the palace at Asshur. The five following reigns were chiefly occupied with wars more or less successful with the Babylonians.

About the year 1120 Tiglath-Pileser I., one of the most eminent of the sovereigns of the first Assyrian monarchy, ascended the throne, and commenced his reign by the conquest of the Syrians and Hittites in the west. He then carried his arms far and wide, subjugating the Moschians, Commagenians, Urumians, and other tribes in the north; on the south he shattered the Babylonian power, and captured their capital. His dominions thus extended from the Mediterranean on the one side to the Caspian and the Persian Gulf on the other. But this empire, acquired and ruled by the energy and genius of one man, began to fall to pieces at his death (1100). The period of decline lasted over 200 years, during which time little is known of Assyrian history.

Under Assur-nazir-pal, who reigned from 884 to 859 B.C., Assyria once more advanced to the position of the leading power in the world. The extent of his kingdom was greater than that of Tiglath-Pileser, and the magnificent palaces, temples, and other buildings erected during this reign, with their elaborate sculptures and paintings, prove that wealth, art, and luxury must have reached a high stage of development. When he ascended the throne Nineveh was the capital of the kingdom, but he restored and beautified Calah, which had suffered during the troubled and declining years of the country, made it his favourite residence, and raised it to the dignity of the chief city of the state. Among the first acts of his reign was the suppression of a revolt by the Assyrian colonists of Naharain (883). This was followed by the victorious campaigns in Zamua on the eastern frontier (882–881), against several rebellious provinces in the north-west (880), and against the Shukhi or Shuhites, who then occupied a tract of country between Babylon and Assyria (879). In another expedition he crossed the Euphrates and advanced to the Mediterranean, near the mouth of the Orontes.

In 859 Assur-nazir-pal was succeeded by his son Shalmaneser II., whose career of conquest was equally successful. The Armenians and Parthians paid him tribute, and he reduced Babylon to a state of vassalage. In the west he defeated a dangerous confederacy formed against him by Rimmon-idri (Ben-hadad) of Damascus, Akhab of Zirlai (probably Ahab of Israel), and the kings of Hamath, Ammon, Egypt, &c. (854). In a later campaign against the allies he defeated the forces of Hazael, Benhadad's successor, laid siege to Damascus, took tribute from the kings of Tyre and Sidon, and from Jehu, king of Israel. The closing years of his reign were troubled by the rebellion of his eldest son Assur-dani-pal, who had gained over to his side the cities of Nineveh, Assur, Arbela, and other important towns. After a good deal of fighting the rebellion was put down by Shalmaneser's second son Samsi-vul (Samas-Rimmon), who succeeded to the throne in 824. The campaigns of his successors are not of much interest or importance, except the Syrian expedition of Vul-nirari, who captured Damascus and obliged the king, Mariha, to pay an exorbitant tribute, including 2300 talents of silver and 20 talents of gold. The old dynasty came to an end in the person of Assur-nirari II., who was driven from the throne by a usurper, Tiglath-Pileser, in 745, after a struggle of some years.

No sooner was this able ruler firmly seated on the throne than he made an expedition into Babylonia, followed by another to the east in 744. In the following year an alliance was formed against Assyria between Sarduri, king of Armenia, and several neighbouring princes, and the Syrians came to their assistance at Arpad, on the Euphrates. Here they were defeated with great slaughter by Tiglath-Pileser, and the Armenian king was chased to the gates of his capital, Turuspa. The conqueror now advanced against Syria, overthrew the ancient kingdoms of Damascus and Hamath, and placed his vassal Hosea on the throne of Samaria. A protracted campaign in Media (737–735), another in Armenia, and the memorable expedition into Syria mentioned in 2 Kings xvi., are among the most important events of the latter years of his reign. Tiglath-Pileser was one of the greatest of the Assyrians; he carried the Assyrian arms from Lake Van on the north to the Persian Gulf on the south, and from the confines of India on the east to the Nile on the west. Yet he was not able to keep his seat on the throne, being driven from it by another claimant named Shalmaneser (727). Little is known of the five years' reign of this prince. He blockaded Tyre for five years, and on the revolt of Hosea, king of Israel, in league with Sabako, king of Egypt, he invaded Israel and besieged Samaria, but died before the city was reduced.

His successor Sargon (722–705) claimed descent from the ancient Assyrian kings. At the very commencement of his reign, after taking Samaria and leading over 18,000 people captive, he overthrew the combined forces of Elam (Susiana) and Babylon. Later on he came into conflict with the northern kingdoms of Ararat and Van. In 720 the revolt of the Syrian princes of Hamath, Samaria, and Damascus, assisted by Sabako of Egypt and Khanun of Gaza, called Sargon to the west. He defeated the King of Hamath, took him prisoner, and flayed him alive in his capital Qarqar, which he afterwards

burned to the ground. Thence the victor advanced through Philistia and captured Ashdod; then pushing south came up with the forces of Egypt and Gaza at Raphia, and totally defeated them (719). The same year Sargon turned his arms against the revolted Armenians, and in 717 he besieged and took the rich trading city of Carchemesh, which had also risen against his authority; here an immense spoil fell into his hands. In 716 the Armenians and several tributary princes in the north again took up arms for independence, but the Assyrians having again triumphed the Armenian king committed suicide and the other princes submitted. The attitude of Babylonia now began to look extremely dangerous. Merodach-Baladan, a Chaldean leader, taking advantage of the troubles which closed the reign of Tiglath-Pileser, had possessed himself of Babylonia, and held it for twelve years, strengthening himself by alliances with Egypt and the various rulers of Palestine. In 710 Merodach-Baladan was driven out of Babylonia; in a single campaign the allies were crushed, Judah was overrun, and Ashdod levelled to the ground. Sargon spent the latter years of his reign in internal reforms, and in founding or beautifying several cities of his kingdom. A new city, called Dur-Sargina, was founded to the north of Nineveh, the library of Calah was restored and enlarged, and special attention was devoted to law reform. In the midst of these labours Sargon was murdered, and was succeeded by Sennacherib, one of his younger sons, in 705.

No sooner was Sennacherib seated on the throne than he had to take up arms against Merodach-Baladan, who had again obtained possession of Babylon. In 701 fresh outbreaks in Syria led him in that direction. He first swept down on Zidon, drove the king into Cyprus, and seated Tubal on his empty throne. Next he deposed Zidqa of Askelon, and advanced against Ekron and Judah. The people of Ekron had dethroned Padi their king, and gave him into the hands of Hezekiah, king of Judah. The Egyptian and Ethiopian forces advanced to the assistance of their Judean allies, but Sennacherib totally routed the confederates at Altaqa in Judah, which he rapidly overran, taking forty-six of its fortified cities. Hezekiah now submitted, agreeing to pay the conqueror a sum of 30 talents of gold and 800 talents of silver. Padi was given up and restored to Ekron, and after Sennacherib had chastised the rebels he returned to Assyria. The threatening aspect of affairs in Babylonia and Elam again called his attention to the south in 700, and in 699 he advanced to the northern boundaries of his kingdom to quell the insurrections which had broken out among the hill tribes. His second expedition into Syria is one of the most memorable in the history of Assyria, and is briefly recorded in 2 Kings xix. Leaving one of his generals to hem Hezekiah in Jerusalem, Sennacherib marched into Arabia, defeated Tirhakah, king of Egypt and Ethiopia, pillaged the territories of the Arabs, and stormed Edom (700). But his career of conquest was stopped by an appalling catastrophe: his army lay before Libna, when in one night 'the angel of Jehovah went out, and smote in the camp of the Assyrians 185,000 men' (2 Kings xix. 35). Sennacherib himself returned to Assyria, and occupied the last years of his reign in repressing the outbreaks of the Babylonians and Elamites, in constructing canals and aqueducts, and in entirely rebuilding Nineveh. In 681 he was murdered by his two sons, Adrammelech and Sharezer, who wished to secure the crown; but they soon found themselves confronted by a veteran army under Esar-haddon, their father's younger and favourite son, who defeated them in a battle at Kanirabbat, and assumed the crown (680).

Esar-haddon first turned his attention to Babylonia and the south; he fixed his residence at Babylon, where he governed in person during the whole of his reign. His first important expedition was into Syria, where Zidon was destroyed and its inhabitants transferred to Assyria. Then followed a successful campaign in the kingdoms of Huz and Buz in the centre of Arabia, 980 miles from Nineveh, 280 of this being through an arid desert. This was succeeded by a northern expedition, in which the Assyrians carried their arms as far as the Caucasus, subjugating the warlike mountain tribes, and killing the Cimmerian chief Teuspa. But the most important event of this reign was the conquest of Egypt, which left Assyria the mistress of the world. In 672 Esar-haddon led his forces into Egypt, drove out Tirhakah, its Ethiopian ruler, and divided the land into twenty separate kingdoms, the rulers of which were his vassals. Feeling unable to cope in person with his rebellious tributaries, Esar-haddon associated his son Assur-bani-pal with him in the government of the kingdom (669).

Two years later this prince (the Sardanapalus of the Greeks) found himself sole ruler, when Assyria was at the height of its glory and magnitude. But constant wars were beginning to exhaust the men and treasure of the empire; and luxury, which had flowed suddenly in like a flood, was enervating the people. The king now no longer appeared at the head of his army, but intrusted it to generals, and abandoned himself to indolence and sensuality. The military events of this reign comprise the check of the southward progress of the Cimmerians, the suppression of a revolt in Egypt, which cost two campaigns, and the complete subjugation of Elam. But in 652 a general insurrection suddenly broke out, headed by Sammughes (Savul-sum-yucin), governor of Babylonia, Assur-bani-pal's own brother, and including Elam, Egypt, Palestine, and Arabia. Egypt was the only power, however, which regained its independence; Babylon and Cuthah were reduced by famine, and Sammughes taken and burned to death; Elam was wasted by fire and sword and converted into a wilderness, and the roving tribes of Northern Arabia were severely chastised. Assur-bani-pal was a zealous patron of the arts; learned men from all countries were welcomed to his court; literary works were collected from all sources; the library of Nineveh was greatly augmented; the study of the dead language of Accad was encouraged, and dictionaries and grammars were compiled. The buildings were unrivalled for magnificence, his palace glittering with gold and silver, and adorned with the rarest sculptures. Unfortunately the king's character was marked by cruelty and sensuality, and his example descended through the court to the people. He died in 625, and was succeeded by his son Assur-ebilili-kain, under whom Babylon definitely threw off the Assyrian yoke. The country continued rapidly to decline, fighting hard for mere existence until, under its last king Sarcus, Nineveh was captured and burned by the allied forces of the Medes and Babylonians in 606 B.C.

Ethnology, Language, Religion, &c.—The original inhabitants of Assyria and Babylonia belonged to that race which has been variously called Turanian, Ural-Altaic, Scythian, or Tatar, and which appears at one time to have occupied the entire region from the Caucasus to the Indian Ocean, and from the Mediterranean to the delta of the Ganges. The ancient Assyrians, therefore, were of the same stock as that from which the Finns, Turks, and Magyars have descended; and their language, which has been preserved to us in inscriptions, and is known by the name of Accadian, is allied to the Ugro-Bulgaric

division of the Finnic group of languages. The Akkadai or Accad race descended from the mountainous region of Elam on the east, and the origin of Chaldean civilization and writing was due to them. In course of time, however, a Semitic race of people spread themselves over the country, and mingled with or supplanted the original inhabitants, while their language took the place of the Accadian, the latter becoming a dead language. Belonging to the Semitic family, these later Assyrians were thus members of the same great division of the human race as the Hebrews, Syrians, Phœnicians, and modern Arabians. The language differed little from the Babylonian, which was characterized by a preference for the softer sounds and a fuller use of the vowels. Both languages retained traces of the influence of the earlier Accadian. Assyrian is closely allied to Hebrew and Phœnician; it has their peculiarities of phonology, vocabulary, and grammar, and some obscure points in Hebrew etymology have been cleared up by its aid. The language changed little throughout the 1500 years during which we can trace its career in the recently deciphered inscriptions. It continued to be written with the cuneiform character down to the third century B.C. Assyria could boast of but little native literature; it was a land of warriors, and the peaceful arts had their home in Babylonia. It was not until the time of Assur-bani-pal that any attempt was made to rival Babylon in learning. Their original works were for the first time composed, and treaties were composed even, in the dead Accad language. The greater part of the literature was stamped in minute characters on baked bricks, but papyrus was also used, although no books in this form have come down to us. The subjects of the Assyrian literature comprise hymns to the gods, mythological and epic poems, and works on history, chronology, astrology, law, &c. The Assyrian religion, like the language and arts, was in most essential points derived from Babylonia. There were the same gods, the same ceremonials and prayers, and even the temples had the same names. There is, however, in one point a notable difference. In addition to the worship of the Babylonian deities the Assyrians adored their national deity Assur, placing him at the head of the Pantheon. He was called king of all the chief gods, the god who created himself, it being supposed that he was self-existent and the creator of all things. After Assur come the twelve chief deities, Anu, god of heaven, ruler of angels and spirits; Bel, the father of the gods; Hea, king of the sea; Sin, or the Moon, lord of crowns; Shamas, or the Sun, judge of heaven and earth; Ninip, god of hunting; Nergal, god of war; Nusku, bestower of sceptres; Beltis, mother of the gods; Ishtar, leader of heaven and earth; and Bel, or Merodach, lord of Babylon. Most of those divinities had consorts, who were not, however, admitted to the first rank of the gods. Below this first rank were a number of spirits, good and evil, who presided over the minor operations of nature. There were set forms regulating the worship of all the gods and spirits, and prayers to each were inscribed on clay tablets with blanks for the names of the persons using them. It is not quite certain how far Assyria required a religious conformity from the subject people.

Art and Science, &c.—Although in art, as in other things, Assyria was the pupil of Babylon, there was yet a notable difference between its development in the two countries, due partly to two causes. The alabaster quarries scattered over the country supplied the Assyrians with a material unknown to their southern neighbours, on which they could represent, far better than the Babylonians on their enamelled bricks, the scenes which interested them. Sculpture was naturally developed by the one, just as painting was by the other, and the ornamentation which could be lavished on the exterior of buildings in Assyria had to be confined to the interior in Babylonia. The Assyrian artists, faithful and indefatigable, acquired a considerable power in representing the forms of men and animals, and produced vivid and striking scenes of the chief occupations of human life. If they did not strive greatly after the ideal, and never in this direction reached a very exalted rank, yet even here their emblematic figures of the gods have a dignity and grandeur which implies the possession of some elevated feelings. But their grand merit is in the representation of the real. Their scenes of war and of the chase, and even sometimes of the more peaceful incidents of life, have a fidelity, boldness, and life-like appearance which place them high among the realistic schools. Unlike that of the Egyptians, which remained comparatively stationary from the earliest to the latest ages, the art of the Assyrians is plainly progressive, becoming gradually more natural and less uncouth, more life-like and less stiff, more varied and less conventional. It may be said to have reached its highest stage of development in the reign of Assur-bani-pal, when it was characterized by great chasteness and softness, delicacy, and finish. The beginning of Greek art coincides with the decadence of the Assyrian, and there can be no doubt that the Hellenic artists owe much to their Assyrian predecessors. The advanced condition of the Assyrians in various other respects is sufficiently evidenced by the representations on the sculptures, and by the remains discovered among their ruined buildings. We now know that they understood and applied the arch; that they constructed tunnels, aqueducts, and drains; that they used the lever and the roller; that they engraved gems in a highly artistic way; that they understood the arts of inlaying, enamelling, and overlaying with metals; that they manufactured porcelain, and transparent and coloured glass, and were acquainted with the lens; that they possessed vases, jars, and other dishes, bronze and ivory ornaments, bells, gold earrings and bracelets of excellent design and workmanship. Their household furniture also gives us a high idea of their skill, taste, minuteness, and accuracy.—The cities of Nineveh, Assur, and Arbela had each their royal observatories, superintended by astronomers-royal, who had to send in their reports to the king twice a month. At an early date the stars were numbered and named; a calendar was formed, in which the year was divided into twelve months (of thirty days each) called after the zodiacal signs, but as this division was found to be inaccurate an intercalary month was added every six years. The week was divided into seven days, the seventh being a day of rest; the day was divided into twelve *casbu* of two hours each, each casbu being subdivided into sixty minutes, and these again into sixty seconds. Eclipses were recorded from a very remote epoch, and their recurrence roughly determined. The principal astronomical work, called the Illumination of Bel, was compiled for the library of Sargon of Agane; it was inscribed on seventy tablets, and went through numerous editions, one of the latest being in the British Museum. It treats among other things on observations of comets, the polar star, the conjunction of the sun and moon, and the motions of Venus and Mars. The study of mathematics was fairly advanced, and the people who were acquainted with the sun-dial, the clepsydra, the pulley, and the lever must have had considerable knowledge of mechanics.

Government.—Like all the ancient monarchies which attained to any considerable extent, Assyria was composed of a number of separate kingdoms. In the

East conquest has very seldom led to amalgamation, and in the primitive empires there was not even any attempt at that governmental centralization which we find at a later period in the satrapial system of Persia. The Assyrian monarchs reigned over a number of petty kings, the native rulers of the several countries, over the whole extent of their dominions. These native princes were feudatories of the Great Monarch, holding their crowns from him by the double tenure of homage and tribute. This system naturally led to the frequent outbreak of troubles. The feudatories were always looking for an occasion when they might revolt and re-establish their independence. The offer of a foreign alliance was often an irresistible bait, and on the occurrence of any imperial misfortune or difficulty, such as a disastrous campaign, a formidable attack, the sudden death of the sovereign, there was a strong temptation to throw off the yoke. The dethronement of the rebel prince, the wasting of his territories, the plunder or burning of his capital, a considerable increase in the amount of tribute thenceforth demanded, and at times even the transplantation of the inhabitants of the rebel country to a distant land, were the consequences of an unsuccessful revolt.

For a short sketch of antiquarian discovery in Assyria see the article NINEVEH; see also CUNEIFORM WRITING. For fuller information consult Botta and Flandin's Monuments de Ninivé (Paris, 1847–50, five vols.); Layard's Nineveh and its Remains (London, 1849); Oppert's Histoire des Empires de Chaldée et d'Assyrie (Paris, 1866); G. Rawlinson's Five Great Monarchies of the Ancient World (second edition, three vols., London, 1871); Lenormant's Lettres Assyriologiques (Paris, 1871–73, three vols.); George Smith's Assyrian Discoveries; Assyria; and The Assyrian Eponym (1875); Duncker's History of Antiquity (six vols., completed in 1882); Sayce's Ancient Empires of the East (1884), and Assyria: its Princes, Priests, and People (1885); Rogers, History of Babylonia and Assyria (1900); &c.

ASTARTE, a Syrian goddess, probably corresponding to the *Semele* of the Greeks and the *Ashtaroth* of the Hebrews. According to Lucian she had a very ancient temple in Phœnicia. Some also believe her to be the same with *Hera* (*Juno*), and others with *Aphrodite*.

ASTER, a genus of plants belonging to the natural order Compositæ, and comprehending several hundred species, mostly natives of North America, although some of the species are found over most regions of the globe. The name is derived from the Greek *astēr*, a star, and is due to the fact that the flowers (*capitula*) bear some resemblance to stars. The species are herbaceous plants, or more commonly shrubs. On account of the large number of species composing this genus it is divided into six or seven groups, which are regarded by some botanists as forming distinct genera. Large as the genus is, it contain no species of any great utility in the arts, but many are cultivated as ornamental plants. The most beautiful species among those which are natives of Europe are the *Aster Alpinus*, *amellus*, and *Pyrenæus*, and among those of America *Aster grandiflorus*, *punicæus*, *eminens*, *multiflorus*, *horizontalis*, *thyrsiflorus*, *roseus*, &c. The China aster (*Aster Sinensis*), introduced into Europe from China upwards of a hundred years ago, is a well-known annual, growing to a height of from 12 to 18 inches, and bearing an abundance of large and beautiful flowers, exhibiting in the numerous varieties every hue except yellow, and a great diversity of marking. The chrysanthemum and peony flowered varieties are particularly worthy of cultivation for the size, colour, and abundance of their flowers. This species is called by the French Reine Marguerite. Some botanists (Nees, Cassini, &c.) refer it to a separate genus, to which they give the name of *Callistephus*. From the lateness of the season in which they bloom some species of Aster have obtained the name of Christmas daisy. Of the species commonly cultivated in gardens, several bloom in September, others in October, and a few continue in flower from November till Christmas.

ASTERIA, a name applied to two distinct species of minerals. One is a variety of corundum, which displays an opalescent star of six rays of light when cut with certain precautions. It consists of alumina, and is found in the East Indies and also in Europe. The other is the *cat's-eye*, which consists of quartz, and is found especially in Ceylon. The name is used by Pliny, but it is not easy to say to which of the two his description best applies.

ASTERISK ('a small star'), a sign to refer to notes. The ancient critics made use of this sign, or of a cross (*obelus*), to point out an incorrect passage in the text of an author. Others used the same mark as a sign of the correctness of a passage.

ASTEROIDS, or PLANETOIDS, the name given to a large number of minute planets existing between the orbits of Mars and Jupiter. As far back as 1596 Kepler had clearly expressed his belief that there must exist a planet, yet unseen, between Mars and Jupiter; but this expression of opinion remained long unheeded. It was not till the middle of the eighteenth century that Titius (in his translation of Bonnet's Contemplations) remarked that if the distances of the planets are reckoned, not from the sun, but from Mercury (calling the mean distance of the earth from the sun = 10), these have the following relations:—Venus 3, Earth 6, Mars 12, Jupiter 48, Saturn 96. These numbers, although not quite exact, are pretty nearly so. In this series there is manifestly a hiatus for the number 24, or 28 counting from the sun; and at about this distance it was decided that the yet undiscovered planet must exist. The series of Titius seemed to be established by the the discovery of Uranus in 1781, whose distance was approximately represented by 192, the next term of the above geometrical series. The conviction of the existence of a planet filling up the gap between Mars and Jupiter gained ground; and at a meeting of several astronomers at the house of Schröter they agreed to divide the heavens among themselves, each undertaking a systematic search for the undiscovered planet in the part that was allotted him. Yet the actual discovery was made quite unexpectedly in another quarter. On the first day of the nineteenth century Piazzi, an astronomer of Palermo, discovered a planet which he at first held to be a comet. Bode, however, was the first to declare that it was the long-sought-for planet, and in this opinion the other astronomers and Piazzi himself gradually joined. The mean distance of this planet suited the hiatus very well, and accordingly the system appeared complete, and the series of Titius established. Then, almost at the same distance, Olbers discovered Pallas, 28th March, 1802; Harding, Juno, 1st Sept., 1804; and Olbers, Vesta, 29th March, 1807. These unexpected discoveries, and the extraordinary smallness of these bodies so near each other, gave rise to the opinion that they were but the fragments of a planet that had formerly existed and had been brought to an end by some catastrophe. For nearly forty years investigations were carried on, but no more planets were discovered till 8th December, 1845, when Hencke discovered a fifth planet in the same region—namely Astræa. From that time onward, in different parts of Europe and America, new discoveries of planets have been made in quick succession; so that in November, 1910, about 600 of these small planets

were known. They all lie between the orbits of Mars and Jupiter, are very small, being only telescopic, and the most of them are even invisible with the smaller telescopes. Their orbits, though intersecting in numerous points, yet occupy a very broad zone; so that the earlier hypothesis of a shattered planet must be given up. Their eccentricities and inclinations are on the average greater than those of the old planets; so that, for example, Pallas may occupy any quarter of the heavens, and for it and some others there is no ecliptic zone, and the sun's disk seen from Polyhymnia is very much greater in perihelion than in aphelion. Their mean distances from the sun vary between 200,000,000 and 300,000,000 miles; the periods of revolution between 1191 days (Flora) and 2343 (Maximiliana). Many planetoids may be yet unknown to us, especially in the neighbourhood of Jupiter. With regard to their forms, periods of rotation, position of axis, and other superficial characteristics, as well as their masses and densities, observation can teach us nothing. With regard to their diameters also, a few perhaps excepted, nothing can be directly decided; and it is only on the assumption that their reflective power is equal to that of Jupiter, Saturn, Venus, and Mercury, which nearly agree in this, that their diameters can be approximately determined. In an opposition of Vesta in March, 1849, she was fortunately seen by the Dorpat refractor as a small disk, and her diameter determined to be 303⅔ miles; from her comparative brilliancy Argelander made it 269 miles. The smallest diminish to only 14 miles in diameter. Even allowing for these bodies a density as great as that of our heaviest metals, gravity on them would still be very small; so that, for example, the fall of a body in the first second (on the earth 16 feet) would be only a few inches, while a hundredweight would weigh but a few pounds. The more accurate calculation of their orbits, or elements of their orbits, has considerable difficulties, since they suffer far greater perturbations than the other planets.

ASTHMA (Greek), difficulty of respiration, returning at intervals, with a sense of stricture across the chest and in the lungs, a wheezing, hard cough at first, but more free towards the close of each paroxysm, with a discharge of mucus, followed by a remission. Asthma is essentially a spasm of the muscular tissue which is contained in the smaller bronchial tubes. Asthma rarely appears before the age of puberty, and seems to attack men more frequently than women, particularly those of a full habit, in whom it never fails, by frequent repetition, to occasion some degree of emaciation. In some instances it arises from a hereditary predisposition, and in many others it seems to depend upon a particular constitution of the lungs. Dyspepsia always prevails, and appears to be a very prominent feature in the predisposition. On the evening preceding an attack of asthma the spirits are often much affected, and the person experiences a sense of fulness about the stomach, with lassitude, drowsiness, and a pain in the head. On the approach of the succeeding evening he perceives a sense of tightness and stricture across the breast, and a sense of closeness in the lungs, with impeded respiration. The difficulty of breathing continuing to increase for some length of time, both inspiration and expiration are performed slowly, and with a wheezing noise; the speech becomes difficult and uneasy; a propensity to coughing succeeds, and the patient can no longer remain in a horizontal position, being, as it were, threatened with immediate suffocation. These symptoms usually continue till towards the approach of morning, and then a remission commonly takes place; the breathing becomes less laborious and more full, and the person speaks and coughs with greater ease. If the cough is attended with an expectoration of mucus he experiences much relief, and soon falls asleep. When he awakes in the morning he still feels some degree of tightness across his chest, although his breathing is probably more free and easy, and the least motion renders this more difficult and uneasy; neither can he continue in bed unless his head and shoulders are raised to considerable height. Towards evening he again becomes drowsy, is much troubled with flatulency in the stomach, and perceives a return of the difficulty of breathing, which continues to increase gradually, till it becomes as violent as on the night before. After some nights passed in this way the fits at length moderate, and suffer more considerable remissions, particularly when they are attended by a copious expectoration in the mornings; and this continues from time to time throughout the day; and the disease going off at last, the patient enjoys his usual rest by night without further disturbance. The exciting causes are various—accumulation of blood or viscid mucus in the lungs, noxious vapours, a cold and foggy atmosphere, or a close, hot air, the repulsion of eruptions or other metastatic diseases, flatulence, accumulated fæces, violent passions, organic diseases in the thoracic viscera, &c. Sometimes the fits return at pretty regular periods, and it is generally difficult to obviate future attacks when it has once occurred; but it often continues to recur for many years, and seldom proves fatal, except as inducing dropsy in the chest, consumption, dilatation of the heart, &c. The treatment must vary according to the form of the disease. By far the most important part of the treatment consists in the obviating or removing of the several exciting causes, whether operating on the lungs immediately, or through the medium of the primæ viæ, &c. Individual experience can alone ascertain what state of the atmosphere, as to temperature, dryness, purity, &c., is most beneficial to asthmatics, though a good deal depends on habit in this respect; but a due regulation of this, as well as of the diet and other parts of regimen, will usually afford more permanent relief than any medicines that can be employed.

ASTI, a town of Northern Italy, in the province of Alessandria, 28 miles E.S.E. of Turin. It stands near the confluence of the Borbore with the Tanaro, and is surrounded by dilapidated walls. The streets, though wide, and possessing several noble mansions, have in general a mean and deserted appearance. The finest building is the cathedral, a venerable Gothic structure, surmounted by a lofty tower, and adorned with many excellent paintings. The trade is chiefly in wine and silk. Asti was in existence about four centuries before the Christian era. It was twice destroyed by the Gauls, and on the latter occasion was rebuilt by Pompey, who gave it its name. Alfieri was born here. Pop. (1901), 24,000.

ASTON MANOR, an urban sanitary district, and since 1885 a parl. bor. of England, in Warwickshire, situated about 1½ mile from Birmingham, of which it forms a suburb. Pop. (1881), 53,844; (1901), 77,310.

ASTORGA, EMANUELE D', an Italian composer, was born at Palermo in 1681. He was educated by the influence of the Princess Ursini, in a monastery in Astorga in Spain, from which he afterwards took his name. He for some time figured as a singer and song-composer at the court of the Duke of Parma, which he was compelled to leave on account of a suspected intrigue with the duke's daughter. He then lived an unsettled life, wandering for many years in Germany, visiting Breslau, Vienna, Prague, &c., and died in 1736, according to some in London, according to others in a Bohemian convent. A Stabat Mater, which he is said to have written in

London, is considered the best of his works, and is really an excellent composition.

ASTRABAD, a town of Persia, situated about 30 miles east of the south-eastern extremity of the Caspian Sea. It was formerly a large and important town, but now is of little importance, though it carries on a trade in horses, sheep, cotton, silk, woollen fabrics, &c. Pop. estimated at from 4000 to 10,000.

ASTRÆA, in mythology, the daughter of Zeus and Themis, and goddess of justice. In the age of gold she was a regular inhabitant of this world; in the age of silver only an occasional visitor; and in the age of brass, when men began to forge weapons of war and deeds of violence, took her departure for the skies, where she is seen in the zodiac, forming the constellation Virgo. She is usually represented with scales in her hand and a crown of stars on her head.

ASTRAKHAN, a government in the south-east of European Russia, on the Caspian; greatest length, 370 miles, which includes tracts inhabited by Kalmuck and Kirghiz tribes; greatest breadth, 250 miles; area, 85,000 square miles. It consists almost entirely of two vast steppes, separated from each other by the Volga, and forming for the most part arid sterile deserts. It appears to have been at one time entirely covered by the Caspian, and hence its soil consists generally of mud, salt, and sand intermixed. In some parts are extensive salt-marshes. The live-stock consist chiefly of sheep of the broad-tailed species. The chief employments are pasturage and fishing—the former occupying the rural and nomadic tribes, and the latter those living on the Caspian coast and the banks of the Volga. Pop. (1897), 994,775.

ASTRAKHAN, the capital of the above government, on an elevated island in the Volga, about 30 miles above its mouth in the Caspian. It chiefly consists of crooked, unpaved, and dirty but broad streets, with irregular houses, formed in part of brick or sandstone, but generally of wood. The communication with the opposite banks of the river is maintained by numerous bridges. The most important edifice is the cathedral, of a rectangular form, with four small gilt and painted cupolas on the roof, and a large one in the centre. Its interior decorations are more remarkable for costliness than good taste, consisting chiefly of pictures, the chief value of which is in the frame. The other buildings and establishments deserving of note are thirty-one stone and several wooden churches, fifteen mosques, the archbishop's palace, government offices, the factory halls for the Russian, Asiatic, and Hindu dealers, courthouses, a Greek seminary, a gymnasium, besides more than twenty superior and ordinary schools, a botanical garden, &c. The manufactures, consisting of silks, cottons, woollens, shagreen skins, morocco leather, and soap, are increasing in extent. The fisheries furnish the staple articles of trade. Immense quantities of fish, caviar, and isinglass are exported to foreign countries. In the fishing season from 20,000 to 30,000 persons connected with the fisheries frequent the city. It is the naval station of the Caspian fleet; is the most important port of the Caspian, and has regular steam communication with the principal towns on the shores of that sea. Pop. (1897), 113,001.

ASTRINGENT, a class of medicines which owe their action to a contraction or crisping of the parts with which they come in contact, by which they diminish or arrest some evacuation by restricting the orifice through which it passes. Astringents employed externally are called *styptics*. Acids, salts, tannin, gum-kino, &c., are among the common astringents.

ASTROLABE (from Greek *astron*, a star, and *lambano*, I take), an old instrument for measuring the altitude of the sun or stars in degrees, minutes, and seconds, by an index attached to a circular plate of metal, having those divisions on its extreme circumference. In modern astronomy this instrument is no longer used, because it has been wholly superseded by the sextant. The first application of the astrolabe to navigation was made by the physicians Roderich and Joseph and Martin Behaim of Nürnberg, when John II., king of Portugal, desired them to invent a method of preserving a certain course at sea. Angles of altitude were found by suspending the astrolabe perpendicularly.

ASTROLOGY, the science which pretends to foretell future events, especially the fate of men, from the position of the stars. Originally, that is among the Greeks and Romans, the word had the meaning of 'astronomy,' and, as in the case of alchemy and chemistry, the pseudo-science and the real science had the same origin. It is among the oldest superstitions in the world, and probably owes its origin to the influence which the sun was observed to have on the seasons, the weather, and the fertility of the earth. This led to the idea that the other heavenly bodies had a similar influence, and not only upon the inanimate earth, but also upon the destiny of individuals and of nations. Most of the ancient writers are agreed that astrology was communicated by the Chaldeans to other nations. From this circumstance astrologers used to be called Chaldeans by the Roman writers; sometimes Genethliaci, or calculators of nativities. They caused so much trouble that Tiberius at length banished them from Rome. The law relating to this banishment of astrologers, however, makes a distinction between geometry and the mathematical, that is, astrological art. However objectionable astrology may be in itself, it has been of essential use to astronomy. It excited more interest in, and led to more careful observations of, the heavenly bodies. During the middle ages astrology and astronomy were cultivated in connection by the Arabs, and their works on the subject are still extant. Pico of Mirandola, who manfully combated the errors of astrology towards the close of the fifteenth century, found but little attention paid to his labours. Even in the sixteenth and seventeenth centuries astrology could boast of literary men, such as Cardan and even Kepler, among its adherents. The Copernican system, the correctness of which has long been completely established, destroyed the foundations of the ancient science; but individuals, in whom fancy or superstition usurps the place of judgment, still continue to cling to it.

It would take up too much space to give an account of the methods in which the astrologers proceeded when they wished to consult the stars, nor indeed were they at all in unison as to some of the chief doctrines of the so-called science. We may mention, however, that it was a universal practice to divide the whole heavens, visible and invisible, by great circles into twelve equal parts, called *houses*. The horizon and the meridian were the chief of these circles, the other four being drawn at equal distances from these and passing through their intersections. As the circles were supposed to remain immovable every heavenly body passed through each of the twelve houses every twenty-four hours. The portion of the zodiac contained in each house was the part to which chief attention was paid, and the position of any planet was settled by its distance from the boundary circle of the house, measured on the ecliptic. The houses were numbered in the order in which they would rise if they moved along with the heavenly bodies, the first being therefore immediately under the eastern horizon. They had different names and different powers, the first being called the house of

life, the second the house of riches, the third of brethren, the sixth of marriage, the eighth of death, and so on. The part of the heavens about to rise was called the *ascendant*, the point of the ecliptic just rising being the *horoscope*. To *cast a person's nativity* was to find the position of the heavens at the instant of his birth, which being done the astrologer, who knew the various powers and influences possessed by the sun, the moon, and the planets, both inherently and according to their positions, could predict with infallible certainty what the course and termination of that person's life would be.

ASTRONOMY (from the Greek *astron*, a heavenly body, and *nomos*, law) is the science which investigates the various phenomena presented by the heavenly bodies, their motions, distances, and magnitudes, their physical and chemical constitution; it contemplates the universe in its widest extent, from the earth on which we dwell to those remote depths of space wherein lie the measureless fields of the gaseous nebulæ. The science is divided into three great departments, which are, however, closely interrelated, and together form the subject of the general inquiries of the astronomer.

1. *Practical or Observational Astronomy*, the most ancient branch of the science, dating from the very infancy of astronomy, treats of the positions, motions, distances and magnitudes of the celestial bodies. It teaches the art of accurately observing their places by means of suitable instruments, and of applying our knowledge to the various requirements of mankind, as in navigation, geographical exploration, the measurement of time, &c.

2. *Theoretical or Gravitational Astronomy*, which dates from Newton's discovery of the laws of gravitation, deals with the dynamical principles on which the motions of the heavenly bodies depend, enables us to deduce the orbits and the masses of these bodies, and puts us in a position to predict their places for years to come. This branch of the science is sometimes known as Physical Astronomy.

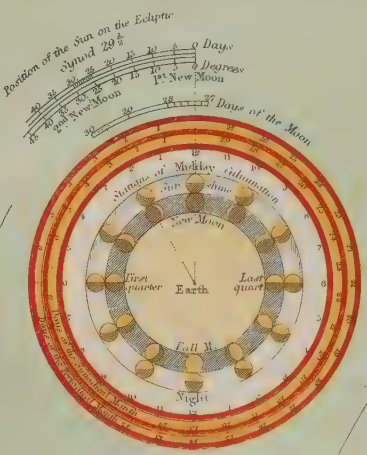
3. *Astronomical Physics or Astrophysics* treats of the physical and chemical constitution of the heavenly bodies. This, the most modern branch, may be said to date from Fraunhofer's first application of the spectroscope to the sun and stars in 1815, although the vast powers of that instrument did not begin to be recognized until in 1859 Kirchhoff discovered the identity of the D lines in the solar spectrum with those of the metal sodium. See SPECTRUM ANALYSIS.

Photography is now employed in charting the heavens, each photographic plate containing certain stars whose places have been well determined by means of the transit circle, and which serve as fiducial points from which the position of the other stars on the plate are obtained by accurate measurement under the microscope. At the present time the principal observatories of the world are engaged in making a photographic survey of the whole heavens. Photography is invaluable in conjunction with the spectroscope in the field of Astrophysics; it is employed in recording the lunar mountains and the ever-changing features of the sun, and in a word has become an indispensable adjunct of the modern observatory.

The most remote period to which we can go back in tracing the history of astronomy refers us to a time about 2500 B.C., when the Chinese are said to have recorded the simultaneous conjunction of Saturn, Jupiter, Mars, and Mercury with the moon. This remarkable phenomenon is found, by calculating backward, to have taken place 2460 B.C. Astronomy appears to have been cultivated in China down to about 230 B.C., when the reigning emperor ordered all old books throughout his dominions to be burned. Hence we can only learn indirectly the substance of the earlier records. Two interesting observations seem to be trustworthy—the appearance of a great comet 2296 B.C.; and the determination of the latitude of Lo-yang and the obliquity of the ecliptic (1106–1098 B.C.) from the shadow of a dial. Astronomy has also an undoubtedly high antiquity in India. The mean annual motion of Jupiter and Saturn was observed so early as 3062 years B.C., if we may trust a statement that is beyond question very old. The Indians formed accurate tables of the sun, moon, and planets, and were able to calculate eclipses. They also divided the heavens into twenty-seven 'moon's-houses', in each of which the moon continued about twenty-four hours. They afterwards exchanged these houses for the twelve signs of the zodiac. In the time of Alexander the Great, the Chaldeans or Babylonians had carried on astronomical observations for 1900 years. This statement gains some credence from the record of eclipses which can be traced backward. The priests of Egypt gave astronomy a religious character; but their knowledge of the science is testified to only by their ancient zodiacs and the position of their pyramids with relation to the cardinal points. A system of the universe is attributed to them, bearing some resemblance to the Tychonic, but it is not ascertainable whether it preceded or followed that of Ptolemy. It was among the Greeks that astronomy took a more scientific form. Thales of Miletus, who was born 639 B.C., and who is said to have studied in Egypt, predicted a solar eclipse. The Pythagorean school cultivated the science, made some obscure reference to the earth's motion, and rectified the calendar; whilst Meton the Athenian (433 B.C.) introduced the lunar cycle of nineteen years, in which period it was supposed that the motions of the sun and moon were equated. Great progress was made in astronomy under the Ptolemies, and we find Timochares and Aristyllus employed about 300 B.C. in making useful planetary observations. But Aristarchus of Samos (born 267 B.C.) is said, on the authority of Archimedes, to have far surpassed them, by teaching the double motion of the earth around its axis and around the sun. A hundred years later Hipparchus determined more exactly the length of the solar year, the eccentricity of the ecliptic, the precession of the equinoxes (see ECLIPTIC, EQUINOX, PRECESSION), and even undertook a catalogue of the stars.

Amongst the Romans, who were devoted to the science of war alone, we are not surprised to find no evidence of astronomical knowledge beyond the most obvious apparent motions of the heavens. And even those must have been observed with little care, otherwise their chronology could not have fallen into the confusion that prevailed down to the time of Julius Cæsar and Augustus. It was in the second century after Christ that Claudius Ptolemy, a famous mathematician of Pelusium in Egypt, propounded the system which bears his name, and which, with all its errors, still retains a value, as marking an epoch when astronomy began to be studied on purely scientific principles. Ptolemy taught that the earth was the centre of the universe, and that the sun, moon, and planets revolved around it in the following order: nearest to the earth was the sphere of the moon; then followed the spheres of Mercury, Venus, the Sun, Mars, Jupiter, and Saturn; then came the sphere of the fixed stars; these were succeeded by two *crystalline* spheres and an outer sphere named the *primum mobile* or first motion, which last was again circumscribed by the *cœlum empyreum*, of a cubic shape, wherein happy souls found their abode. Everything in the Ptolemaic system was made con-

MOON'S COURSE & PHASES



Apparent Sizes of Planets as seen from the Earth, when at their greatest & least distances respectively, as compared with the Sun's disk, represented by the circle A B C D.

The Planets revolve around the Sun in elliptical orbits, and are consequently always varying their distances from him: and their orbital velocity is continually increasing or decreasing in virtue of the law, that the Radius Vector describes equal areas in equal times

Halley's Comet. 1742 & 1835

Encke's Comet 1838

Perihelion

Aphelion

Neptune

Uranus

Saturn

Jupiter

Mars

Earth

Venus

Mercury

A

B

C

D

Aries

Taurus

Gemini

Cancer

Leo

Virgo

Libra

Scorpio

Sagittarius

List of Greater Planets

Name of Planet	Period of Revolution in days	Inclination of Orbit to the Ecliptic in 1800
Mercury	88	7° 0′ 11″
Venus	225	3 23 37
Earth	365	0 0 0
Mars	687	1 51 1
Jupiter	4.333	1 18 31
Saturn	10.759	2 29 33
Uranus	30.688	0 46 21
Neptune	60.181	1 46 45

Diameters & Distances of Sun Moon & Greater Planets

	Equatorial Diameter in English Miles	Mean distance from Sun in Eng. Miles
☉	866.500	
☾	2.163	92,900.000
☿	3,000	36,000.000
♀	7.700	67,200.000
⊕	7.927	92,900,000
♂	4,230	141,500,000
♃	88,200	483,000,000
♄	75,000	886,100,000
♅	32,000	1,782,000,000
♆	35,000	2,792,000,000

Comparative Magnitude of Planets, with Distances of their Satellites

Mercury ☿

Venus ♀

Earth ⊕ — Distance of the Moon ☾

Mars ♂ — Distances of Satellites 1st 2nd Sat.

Jupiter ♃ — Distances of Satellites 1st Sat. 5th Satellite

Saturn ♄ — Distances of Satellites 1st Sat. 2nd 3rd 4th 5th

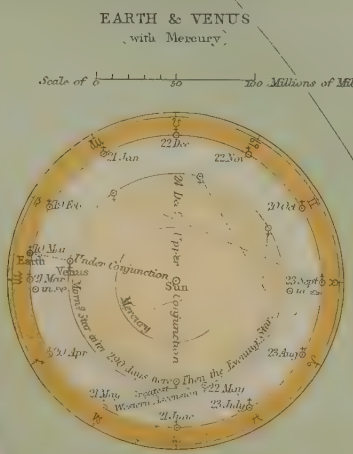
Uranus ♅ — Distances of Satellites 1st Sat. 2nd 3rd 4th

Neptune ♆ — Distances of Satellites 1st Satellite

The Solar System consists of 8 principa… space between Mars and Jupiter Sa… viz the Earth 1. Mars 2. Jupiter 5. Saturn 8. Ura… the Sun and then recede again into remo…

The circular…

SOLAR SYSTEM.



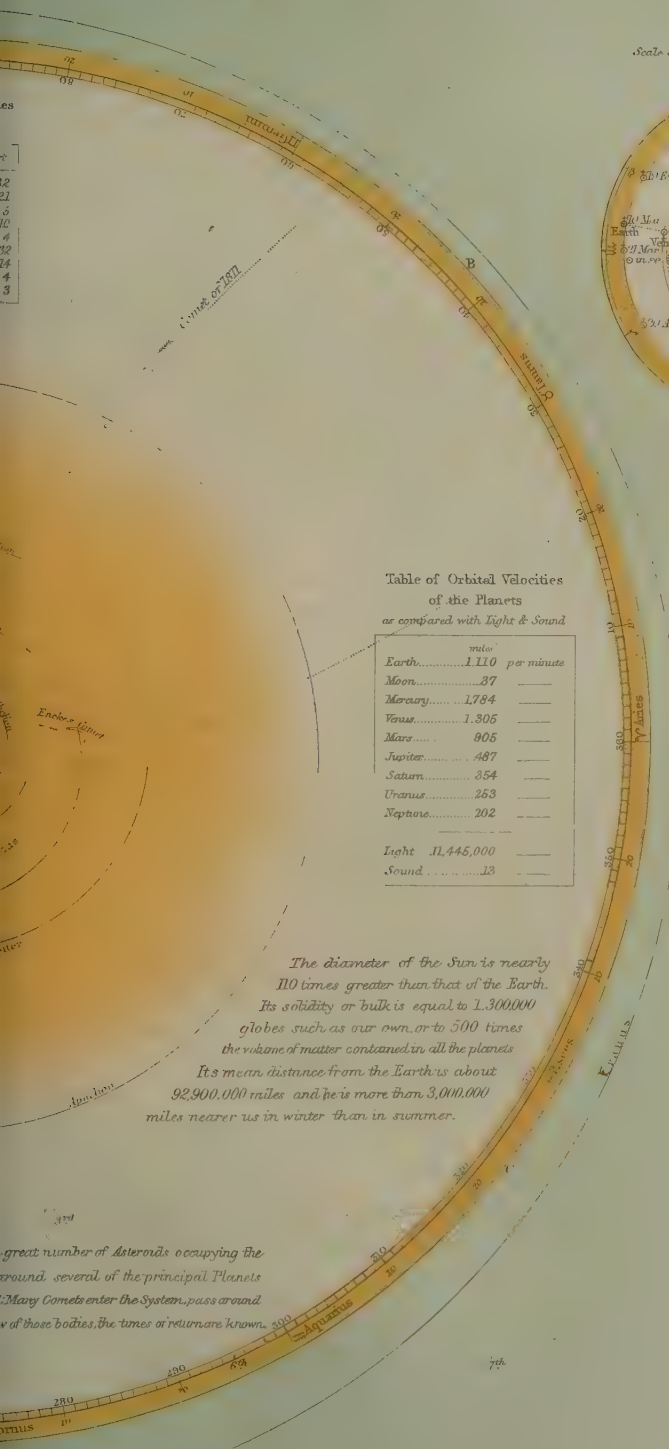


Table of Orbital Velocities of the Planets

as compared with Light & Sound

	miles	
Earth	1.110	per minute
Moon	.37	———
Mercury	1.784	———
Venus	1.305	———
Mars	905	———
Jupiter	487	———
Saturn	354	———
Uranus	253	———
Neptune	202	———
Light	11,445,000	———
Sound	13	———

The diameter of the Sun is nearly 110 times greater than that of the Earth. Its solidity or bulk is equal to 1,300,000 globes such as our own, or to 500 times the volume of matter contained in all the planets. Its mean distance from the Earth is about 92,900,000 miles and he is more than 3,000,000 miles nearer us in winter than in summer.

Asteroids.

Name of Asteroid	Date of Discovery	Name of Discoverer	Period of Revolution in Days
Ceres	1801	Piazzi	1681
Pallas	1802	Olbers	1682
Juno	1804	Harding	1592
Vesta	1807	Olbers	1326

The relative distances of the Planets from the Sun are Mercury 3·9, Venus 7·2, Earth 10, Mars 15·2, Jupiter 52·0, Saturn 95·4, Uranus 191·8, Neptune 300·6. The great interval between Mars and Jupiter was long suspected and is now known to be filled with small planetary bodies. Of these the earliest discovered are named above. More than 400 have now been discovered. But these small bodies have little interest except for the Astronomer.

great number of Asteroids occupying the
around several of the principal Planets
Many Comets enter the System, pass around
of those bodies, the times of return are known.

8th Sat. distant 2,225,000 miles from Primary

Scale for Magnitudes of Planets & for distances of Satellites from their Primaries

200 000 250,000 300,000 400,000 500,000 English Miles

exhibits the proportional magnitude of the Sun, on the same scale that is used for the magnitudes of the Planets.

formable to apparent motion, and its notions of celestial structure were at once cumbrous and extravagant. The firmament was believed to consist of a number of hollow spheres, resembling the successive coats of an onion, and the planets were conceived to be fixed in them, and carried with them in their revolutions around the earth. The fixed stars were supposed to be all at an equal distance from the earth and to be riveted in the sphere that carried them like golden nails. It was a strange fancy, still preserved as a poetical tradition, that the movement of the orbs gave forth harmonic sounds—the music of the spheres.

As the Western Empire declined, a darkness settled over Rome and the greater part of Europe; and the regulation of the Easter festival at the Nicene Council in 325 only slightly recalled attention to celestial movement in relation to times and seasons. So late as about 700 the earth came to be again regarded as an extended plane, and the doctrine of the *antipodes* was repudiated by the church. From seventy to 100 years later, Isidorus Hispalensis attempted to explain the observed direct and retrograde motions of the planets, by assuming that "in the deep night in which they then found themselves they lost their way, wandered about, and returned slowly trying to find it, which sooner or later they succeeded in doing". The dawn of astronomy again broke forth amongst the descendants of the prophet Mohammed. Under successive caliphs and into the fourteenth century the science made progress in Arabia; and nothing seemed wanting but a system to distinguish between apparent and real motion to bring on an advance of knowledge that would have anticipated future discovery until the invention of the telescope. From Arabia astronomy penetrated into Persia, Mongolia, and Usbeck Tartary, whose sages were eager to emulate the Arabs. And it is recorded of the Persian astronomer Omar Khayyám that he proposed a rectification of the calendar even more proximately true than the Gregorian. Whatever might have been effected in Europe at this period was stifled by the fanaticism of the church, which would tolerate no hypothesis or doctrine that in its view disturbed the literal statements of the Bible. Roger Bacon, a great spirit of the thirteenth century, vainly sought rest under the monk's cowl whilst pursuing his optical and astronomical studies. And the learned Alphonso, king of Castile, who endeavoured by himself and with the aid of others to improve the Ptolemaic tables, lost his crown and died in poverty. Germany then became a centre of astronomical science; and the great astronomer and mathematician Purbach produced tables of high value; whilst the celebrated Regiomontanus gave to the world the first good and complete Ephemerides. In the sixteenth century Nicholas Copernicus, born in 1473, introduced the system that bears his name, and which gives to the sun the central place in the solar system, and shows all the other bodies, the earth included, revolving around him. This arrangement of the universe (see COPERNICUS), although rejected by the church, and at first by the Ptolemaic astronomers, came at length to be generally received on account of the simplicity it substituted for the complexities and contradictions of the theory of Ptolemy. Tycho Brahe, a Danish astronomer, born in 1546, sought a compromise between the systems of Ptolemy and Copernicus by making the sun the centre of the planets, and causing him and them to revolve around the earth. This hypothesis, which was scarcely at all received, seems to have been set forth mainly in deference to the church.

But if Tycho failed in system-making, his observations and calculations, continued over many years, were of the highest value, and claim for him the title of regenerator of practical astronomy. His assistant and pupil, Kepler, born in 1571, was enabled, principally by the aid he received from his master's labours, to arrive at those laws which have made his name famous. 1. That the planets move, not in circular, but in elliptical orbits, of which the sun occupies a focus. 2. That the radius vector, or imaginary right line joining the sun and planet, moves over equal areas in equal times. 3. That the squares of the times of the revolutions of the planets are as the cubes of their mean distances from the sun. Galileo, who died in 1642, advanced the science by his observations and the new revelations he made through his telescopes, which established the truth of the Copernican theory. He demonstrated the lunar-like phases of the planets in their course around the sun and discovered four satellites of Jupiter. Newton, who was born in 1642, the year of Galileo's death, taking advantage of the labours of his distinguished predecessors, carried physical astronomy suddenly to comparative perfection. Accepting Kepler's laws as a statement of the facts of planetary motion he deduced from them his theory of gravitation, and he verified that the moon is kept in her orbit by a force obeying the same law as the force which causes a heavy body at the earth's surface to fall. With some intervals of lesser activity the progress of astronomy since the time of Newton has been a continued triumph. To him and Kepler the science is indebted for a complete knowledge of the laws of planetary motion. Subsequent inquirers have devoted themselves to the application of these laws. To the distinguished men associated with the history of astronomy in its earlier periods and down to the time of Newton, a long roll of bright names is to be added, of which only a few can here be given. Halley produced his theory of comets; Bouguer and Maupertuis exerted themselves to determine the figure of the earth; Bradley discovered the aberration of light; and Roemer determined its velocity from observation of the eclipses of the moons of Jupiter. Laplace, by his Mécanique Céleste, confirmed and completed the structure of Newton. Among the names of the many famous astronomers of the nineteenth century may be mentioned those of the Herschels, Gauss, Bessel, the Struves, Piazzi, Olbers, Leverrier, Adams, Airy, Huggins, Auwers. As the telescope has increased in power discovery has succeeded discovery until marvels of creation, undreamed of by Chaldean sages or their successors, have been brought to human vision; and the spectroscope has revealed the chemical constitution of the heavenly bodies, enabling us to recognize in these far distant orbs the metallic and gaseous elements that we find here on the earth. The researches of recent years have been wide in their range, yet having together a unity of purpose—the determination of distances and magnitudes with certainty, the solution of all problems of motion, the relations of the several parts of the cosmos to the whole, and the physical structure of the universe, from our earth and its satellite to the faint and far-distant nebulous mist that floats on the outskirts of the visible creation.

In proceeding to give a general outline of astronomical phenomena nature seems to suggest that they may be classed under the heads of Revelations of the Day and Revelations of the Night.

Revelations of the Day.—Under this head we shall record the observations of a thoughtful and intelligent spectator during a long summer day. We suppose him to be far removed from the hum of men, to have ascended some eminence commanding a wide horizon, and to have earth and sea at once spread out before him. From this stand-point he will contemplate

phenomena having more immediate reference to the earth on which he dwells. With the early sunrise he will see the luminary of day commencing his course in the north-eastern sky, and can watch its ascent as it advances to meridian height, and its onward progress until it reaches the north-western point of its setting. He will note the wide amplitude of its diurnal path, and the great height to which it rises in the sky; and his experience will lead him to mark the difference between a summer and a winter day, and between the two extreme seasons that prevail in his own country and locality. Inquiring as to these he will learn that he resides on a globe that revolves on its own axis and around the sun, under such conditions that it presents its poles to the sun in succession; and that hence arises, in any given locality, the variety of the sun's diurnal path and meridional elevation. (See EARTH, ECLIPTIC.) It will readily occur to him that, as the apparent path of the sun can be for no two days the same, it must be continually ascending or descending in the sky, and that its annual course is a spiral of ascent and descent, causing the longer half of the day to be, for one half of the year, from noon to sunset, and for the other half, from sunrise to noon. His next consideration will be that on different parts of the earth's surface great variety of sunlight and season must prevail on the same day; and that the time in different districts and countries, more or less distant from each other, must differ widely, since the sun cannot have his noonday height in all places at the same time. (See LATITUDE, LONGITUDE.) In thought our observer can transport himself from the position he holds to the equator or to the poles of the earth; at the equator, which the sun crosses twice in the year, he will readily apprehend the continual equality of day and night, the great elevation at all times of the sun in the sky, and the scarcely perceptible variation of season; whilst at the poles he can understand that the sun continues above the horizon, or natural boundary of sight, for six months, ascending and descending in a spiral, and that to this extended day succeeds a night of equal duration. Not confining his view to the sun alone, our spectator's attention will have been called to the movement of the ocean. It may have been that in the early morning the waters flowed inward to the shore, and continued this flow for six hours, when they retired during the next six hours, leaving the beach dry. Inquiring as to this, he will learn that the moon which cheers our night, and gives us views of nature peculiarly its own, exerts a great influence upon the ocean, and that its effect varies according to its relative position in the orbit it describes around the earth. (See TIDES.) Ascertaining that the moon draws the waters into a high wave as it passes over them, he can readily imagine that if there were no impediments to the advance of this wave it would travel on with regularity; but his knowledge of the earth's surface prepares him to learn that the configurations of the land oppose obstacles to this regularity, and that it is only in the free southern ocean that a tidal wave can be raised with sufficient momentum to meet all obstacles, and at length to break upon our northern shores, long after it set forth on its course. We may assume that various phenomena will be witnessed by our observer, not of usual occurrence. The day he has chosen may be especially remarkable, as the time of a total eclipse of the sun. He will be interested in watching a circular shadow gradually covering up the face of the sun, until at length it is wholly obscured.

This remarkable spectacle he will readily admit must be the result of some body intervening between us and the sun, and he will be prepared to hear that this body is the moon, whose unenlightened face is turned towards the earth. (See ECLIPSE.) Knowing that the moon completes her revolution in a month, and that once in every month she is between the earth and sun, he might expect a monthly return of the eclipse, were he not told that the moon's orbit does not coincide with the earth's path, and that therefore when she is between the earth and the sun she may not lie in the right line that joins their centres. He will not be surprised to learn that a total solar eclipse is of rare occurrence, and more especially so with reference to any given locality, when he is assured that the moon must at the time of eclipse be at its least distance from the earth, and that, moreover, from the smallness of the shadow it projects into space, it can cover but a very small part of the earth's surface under the most favourable conditions. During the brief interval of impressive gloom he will be awed by strange stillness and weird-like appearance of things, so far as his eye can define them, and by the consternation of the lower animals, and the sudden appearance of the stars, so lately obscured by the greater light. Whilst this impressive phenomenon is before him it is within the range of possibility that another may be presented, strangely awful in itself, and yet more so from its coincidence with a total eclipse of the sun. He may be startled by the sound 'as of a rushing mighty wind', and see a dull red body falling with great velocity to the earth. This he will be told is an aërolite, or meteoric stone, a body foreign to the earth, that in its travel through space has come within the sphere of the earth's attraction. He will also be told that it is composed of substances with which we are familiar, but assembled under a combination that marks distinctly its extra-terrestrial origin. (See METEORIC STONES.) Our observer's day may close with a lingering look at the gradual diminution of the light after sunset; and this is to be explained to him as an effect produced by the atmosphere, or ocean of air that surrounds the earth, which refracts or bends the rays of light, and throws them upwards into the sky after the sun has departed. From the oblique or direct course of the sun's descent he will apprehend that the after-light will be of longer duration at one season than at another, and that it will vary in duration also in different countries. He is to learn that at and near the equator, where the sun goes down perpendicularly, the night follows close upon the day; but that the oblique descent in high latitudes, and more especially in an advance towards the poles, gives a continuance of after-light, or twilight, reaching from a few hours to a continuous period of several months. See TWILIGHT.

Revelations of the Night.—A spectator on the earth's surface occupies a revolving and commanding observatory, whence he can overlook an entire hemisphere of the sky, whose aspect is continually changing. It may seem strange to commence his night observations with allusion to the sun, yet what in truth is this luminary but a star, so comparatively near to us that his light far exceeds that of all the heavens beyond, whilst his apparent no less than his real magnitude impresses us, and his structure, as revealed by the telescope, fills us with astonishment. (See SUN.) Away in the immensity of space, a multitude of suns cover the celestial vault, and the twinkling points to which they are reduced only evidence their exceeding distance from our system. They differ in glory, or in brightness, as in respect to us they are nearer or more remote. To assist an orderly contemplation of the stars, man has grouped them into clusters or constellations, and registered their positions, so that he can readily find them wherever they may lie in the visible hemisphere. They preserve, at least to unaided vision, an unalterable relation to each other, because their distance is so vast, that even the diameter of the

earth's orbit becomes a physical, or inappreciable, point when projected into stellar regions. (See FIXED STARS, CONSTELLATIONS.) The apparent movement of the stars from east to west, a nightly phenomenon familiar to the spectator, is the result of the earth's revolution on its axis in twenty-four hours from west to east. They move through various arcs of the sky from the horizon to the zenith, and as they decline towards the west and set, others rise up in the east to follow in their course. For the same reason that the sun alters his apparent path from day to day throughout the year, the aspect of the starry heavens is changed nightly, and with the succession of the seasons new constellations come into view and others disappear, an effect due to the earth's annual motion, which transfers the eclipsing brightness of the sun to the entire circle of the heavens. (See ECLIPTIC.) A continuous observation, night by night, reveals the fact that there are bodies amongst the stars which have not only an apparent, but also a real and proper motion. The spectator will note how these recede from the western and advance towards the eastern stars. These are the planets (which see), which, like our earth, revolve around the sun in their several orbits and periods. The orbits of two of them lie within that of the earth, whence they are always seen in the neighbourhood of the sun, and seem, as they travel on, to move sometimes direct and at others retrograde. They present also moon-like phases to the earth, according to their position with relation to it and the sun; and occasionally they are seen as dark spots on the face of the sun. Those planets whose orbits are exterior to that of the earth have a wider course, and are at one time in apparent vicinity to the sun, and at another in a directly opposite part of the heavens. (See PLANET.) Of all the planets, Venus, Mars, Jupiter, and Saturn are those which most arrest the attention of the ordinary spectator; for Mercury is too near the sun to be seen except under very favourable conditions, whilst Uranus and Neptune, and especially the latter, require telescopic aid to give them an interest. Of all the planets perhaps Venus is the one on which we look with the highest gratification. It becomes alternately the morning and the evening star, according as it rises before the sun or sets after him. Amongst the planets must be included the asteroids, of which more than 600 are known, forming a broad zone of small bodies circulating in the space between Mars and Jupiter. See ASTEROIDS.

The moon, from its relative magnitude and brightness, is that one of the secondary planets or satellites to which the spectator's attention is earnestly directed. We have adverted to its influence upon the waters of the ocean and to the mellowing light it throws over the landscape; add to these that its ever-varying phases mark the progress of the month, and that its entrance into the earth's shadow at the opposition presents to us the impressive phenomenon of its eclipse. (See ECLIPSE.) Though of less interest than a total eclipse of the sun, a total eclipse of the moon is of far longer duration, in consequence of the great breadth of the earth's shadow. Whilst the earth has only one moon Mars has two, Jupiter five (four of them long known), Saturn ten, and Uranus four. Of these only four moons of Jupiter can be commanded by the small telescopes usually in the hands of ordinary observers. Their motions and frequent eclipses are very interesting to witness, and the latter more especially so from their having afforded data for determining the velocity of light.

The stars, the primary and secondary planets, and the moon are not, however, the only bodies that meet the general eye at night. At intervals, more or less distant, stranger-lights come down into our system from the distant regions of space. These move either in long elliptical orbits, and may return again and again to us, or in curves that permit only one approach, after which they can be seen no more. These remarkable visitants, of which we know but little, differ greatly in their magnitude and brilliancy, but even the most lustrous of them are dependent on a dark starry night for their extreme splendour. Many will remember the comet of 1858 (*Donati's*); and it is a choice memory for those who witnessed its transit over the bright star Arcturus. (See COMETS.) In our former section we adverted to the possible coincidence of the fall of a meteoric stone with the occurrence of a total solar eclipse. We may suppose the night observer also to have an unusual phenomenon brought before him—that of a continued shower of meteors. The sun appears to have immense multitudes of small bodies revolving around him in cometary orbits, and the earth at certain intervals passes through their midst, when the resistance they meet with from its atmosphere causes them to ignite and take a gaseous form long before they reach the earth. From one remarkable period of their presentation they have obtained the name of *November meteors*. They come into our atmosphere at determined periods in vast numbers, and from one point in space, making the night radiant and gorgeous; and by a well-known law of perspective they appear to scatter as they approach the earth, and to traverse a large portion of the night sky.

The attention of an observant spectator cannot fail to be drawn to certain cloud-like forms of light that beam faintly in the heavens. These take the general name of *nebulæ* (see NEBULA), but they are to be separated into star-swarms and clusters and the nebulæ proper. Under the telescopes of a Herschel or a Rosse certain of them are resolved into multitudes of stars, whilst others resist all the optical power brought to bear upon them. They are, so to speak, the outer curtain of the material creation, and are invested with a mystery in a large degree impenetrable. We have already referred to the wonderful results obtained from the spectroscopic observation of the heavenly bodies and the comparison of celestial spectra with those produced by the elements present in terrestrial substances. This comparatively new process of inquiry into the character and constitution of the universe throws a new light on the study of the nebulæ. Whilst many of them are resolvable into stars, and give spectra confirmatory of this fact, many others show only the spectra of cosmic vapours or gases in a high state of incandescence, which enables their light to reach us from distances too vast to be estimated. It is indeed an established fact that there are almost illimitable fields of gaseous matter lying in far distant regions of the cosmos waiting a higher development, or, as is shown in some instances, advancing towards that development.

Of the numerous works on astronomy it is sufficient to name those of Newton, Lalande, Biot, Laplace, Bode, Bessel, and Piazzi; to which may be added Arago's Popular Astronomy, translated by Smyth and Grant; Airy's Ipswich Lectures; Lardner's Handbook of Astronomy; Sir John Herschel's Outlines of Astronomy; Newcomb's Popular Astronomy; Proctor's Old and New Astronomy; Ball's Story of the Heavens; Young's General Astronomy.

ASTURIA, or THE ASTURIAS, formerly a Spanish principality, bounded by Biscay on the east, Galicia on the west, Castile and Old Leon on the south, and the sea on the north. To this mountainous country of the north of Spain the Goths retreated in the eighth century before the sword of the Saracens, who never penetrated into it with any real success. The inhabitants of Asturia live more upon maize, chestnuts and other fruits, game, fish, honey, and

beans than upon wheat or similar grain. They are said to be less industrious than the Galicians, and less sociable than the Biscayans. The country is not capable of supporting all the inhabitants, and therefore many of them enter the service of other Spaniards, who are in their eyes much less noble than themselves. The hereditary prince of Spain has borne since 1388 the title of Prince of Asturia, or of the Asturias, according to the obsolete division into Asturia de Oviedo and Asturia de Santillana, Oviedo and Santillana being the two chief cities of the principality. Since 1838, when the latter city was transferred to the province of Santander, the principality has been officially known as the province of Oviedo. See OVIEDO.

ASUNCION, or NUESTRA SEÑORA DE LA ASUNCION (in English, *Assumption*), the chief city of Paraguay, on the river Paraguay, nearly opposite the mouth of the Pilcomayo. The principal edifices are the cathedral, several other churches and convents, the president's palace, house of congress, arsenal, custom-house, a college, hospital, railway-station, &c. Asuncion was taken and plundered by the Brazilians in 1869, and some of the leading buildings still remain in a half-ruined condition. The trade of the town is in Paraguay tea, tobacco, fruits, hides, timber, provisions, manufactured goods, &c. Steamers and sailing vessels ply on the river. The town was founded on the feast of the Assumption in 1537, hence its name. Pop. (1905), 60,000.

ASYLUM, a place to which persons flee for protection. Among the ancients, temples, statues of the gods, and altars afforded such a refuge, and it was deemed an act of impiety to remove forcibly one who had fled to them for protection, though sometimes their sacred character was disregarded. All temples and sacred places, however, were not asylums, but only those particularly consecrated for this purpose. The Emperor Tiberius abolished them all except the temples of Juno and Æsculapius. These institutions passed over to the Christian world. Under Constantine the Great all Christian churches were asylums for those who were pursued by the officers of justice or the violence of their enemies. The younger Theodosius extended the privilege in 431 to all courts, gardens, walks, and houses belonging to the church. The Franks confirmed the privilege, and in 681 the Synod of Toledo extended the limits of asylums to 30 paces from every church. This ecclesiastical privilege long prevailed in most Roman Catholic countries. In Britain and elsewhere this name has been given to many charitable institutions for the relief of orphans, blind, or dumb and deaf persons, lunatics, &c.

ASYMPTOTE, derived from three Greek words, meaning 'not to fall with' or coincide, is used in geometry to designate a line which is continually approaching another line, but never meets it, however far either of them may be prolonged. At least one of the lines must be a curve. Though the very existence of such a line seems paradoxical, it can be demonstrated on the strictest mathematical principles, as in the case of the hyperbola and its directrix. The term occurs for the first time in the conic sections of Apollonius.

ATACAMA, a desert region on the west coast of South America, formerly belonging partly to Bolivia partly to Chili, but now belonging wholly to the latter, and giving name to one of its provinces. It may be regarded as a plateau extending from Copiapo northward to the river Loa, which was formerly the boundary between Bolivia and Peru, and it lies between the Andes and the sea. Great part of it lies at the height of 3000 to 5000 feet above the sea, and is intersected by ravines and short streams, on whose banks are found occasional patches of cultivated ground, more frequently of stunted grass. The desert of Atacama proper, a tract almost entirely destitute of water and vegetation, lies partly in the Antofagasta territory of Chili partly in the province of Atacama. The soil consists of stones and gravel, and the surface is diversified with many mountains. The Salina of Atacama, a salt morass, mostly dried up, has a surface of 1084 square miles, and lies at the height of over 7000 feet. At its northern extremity lies the little town of Atacama, with 500 or 600 inhabitants. North-east is the volcano of Atacama. The Chilian province of Atacama has an area of 43,180 square miles, and a population of 59,713. Rich silver mines exist near Tres Puntas (2000 to 3000 inhabitants) in the east of the province and in other places. Gold is also found, as well as argentiferous lead, nickel, cobalt, and iron. The surface of great part of the province is covered with masses of lava, porphyry, and other volcanic products. Copiapo is the capital. The Bolivian province of Atacama, or Cobija, now belonging to Chili, though the poorest and most thinly peopled of the state, being mostly desert, was of the greatest importance to Bolivia as being the only part of it touching the sea. The mountains are rich in gold, silver, and copper.

ATACAMITE, a mineral consisting of a combination of protoxide and chloride of copper, occurring abundantly in some parts of South America, especially in the Atacama region, whence its name. It is worked as an ore of copper, and is exported to England.

ATAHUALPA, or ATABALIPA, the last of the Incas. He succeeded his father in 1529 on the throne of Quito, whilst his brother Huascar obtained the Kingdom of Peru. They soon made war against each other, when the latter was defeated, and his kingdom fell into the hands of Atahualpa. The Spaniards, taking advantage of these internal disturbances, with Pizarro at their head, invaded Peru, where they were entertained with no little hospitality by the king and the people; but instead of returning the kindness, they held Atahualpa in captivity, and requested him to acknowledge the King of Spain as his master, and embrace the Christian religion. Upon his asking their authority for this request, the friar Valverde gave him the breviary as authority. Atahualpa put it to his ear and said, 'It tells me nothing', then threw it away. This was made a pretext for a massacre of the people and the imprisonment of the king. He offered a large sum of gold as a ransom; this the Spaniards took, but still kept him prisoner. At last he was sentenced to be burned, but on consenting to be baptized was strangled instead in 1533. Marmontel's historical romance Les Incas is based on the history of Atahualpa. See PIZARRO.

ATALANTA, the name of two female characters in the Greek mythology. One of them was a native of Arcadia, the daughter of Iasus and Clymene, celebrated for her skill in archery. She slew with her arrows the Centaurs Rhœcus and Hylæus, who were about to offer violence to her; sailed to Colchis with the Argonauts, and was afterwards present at the chase of the Calydonian boar, which she first wounded; hence Meleager awarded to her the prize. (See CALYDON and MELEAGER.) She was renowned for her beauty and swiftness in running. Conscious of her exquisite beauty and her great fleetness, she stipulated that every candidate for her hand should run a race with her, and if he conquered her she was his own, but if he was conquered he was doomed to death at her hand. Many had fallen victims in the attempt, when Meilanion, by the aid of Aphrodite, overcame her. The goddess gave him three golden apples, which he threw behind him, one

after another, as he ran. Atalanta stopped to pick them up, and Meilanion reached the goal before her. She accordingly became his wife. The other Atalanta, who cannot very well be distinguished from the preceding, the same stories being told about both, is connected with Bœotia and Bœotian localities. She is said to have been married to Hippomenes. Both Atalantas, with their husbands, are said to have been latterly metamorphosed into lions.

ATAVISM. See SUPP.

ATBARA (*Bahr-el-Agwad*, or Black River), an important tributary of the Nile. It rises in Abyssinia in the mountains to the north-west of Lake Tzana, flows to the north, receiving several large tributaries, especially the Mareb and Tacazzé, and enters the Nile about 18° N., bringing with it a rich deposit of fertilizing mud.

ATCHAFALAYA ('Lost Water'), a river of the United States of America, an outlet of the Red River in Louisiana. It commences a few miles from the junction of the former river with the Mississippi, flows southward through Grand Lake, and enters the Gulf of Mexico by Atchafalaya Bay. Its length is estimated at 250 miles. It is supposed to have been formerly the principal channel of the Red River.

ATCHEEN. See ACHEEN.

ATCHISON, a city of Kansas, United States, on the Missouri, 35 miles north of Leavenworth. It is an important railroad centre, and has a good trade, but has not made much progress since 1880. Pop. (1880), 15 106; (1900), 15,722.

ATE, among the Greeks, the goddess of hate, injustice, crime, and retribution. Just before the birth of Hercules she excited Zeus to a strain of boasting, and thus afforded Hera an opportunity to overreach him by bringing Eurystheus first into the world. The indignant monarch of the gods seized her by her hair, precipitated her to the earth, and swore that she should never return to Olympus. Fable informs us that she has ever since paced the earth with incredible velocity, and spread destruction and misery everywhere. Hesiod calls her a daughter of Eris (Strife).

ATELIERS NATIONAUX. Previous to the outbreak of the French revolution of February, 1848, there had been two years of scarcity, inundation, and commercial crisis. One of the earliest acts of the provisional government was to *guarantee the existence of the labourer by labour*. This was afterwards explained to mean that in giving relief to the poor it should be done by providing work rather than by gratuitous charity; but the expression unfortunately covered an impracticable theory, and the large scale on which relief was granted could not be otherwise than highly dangerous. *Ateliers nationaux*, or national workshops, were opened at once. The workmen were organized under lieutenants and brigadiers of their election. The pay at first was 1 franc 50 centimes per day, afterwards 1 franc for idle men and 2 for those actually employed. It was finally fixed at 8 francs a week. Brigadiers received 3 francs a day, lieutenants 2·50 francs. A great many unprincipled scoundrels got themselves elected brigadiers, and got up sham lists of workmen for whom they drew pay. The number of applicants, including arrivals from the provinces, at length exceeded 100,000, and the total expense reached nearly 16,000,000 francs. The men were employed on roads, railways, earth-works, &c., but it was impossible to find work for the whole, and a great part of the labour was unprofitable. There were besides 30,000 to 40,000 women employed in preparing articles of outfit for the army, whose work left only a trifling loss. In June the Constituent Assembly resolved upon the immediate closing of the ateliers. This rash step provoked the insurrection of the Red Republicans (23rd–26th June), which was suppressed by General Cavaignac with fearful slaughter. In Lyons the ateliers were closed without disturbance, but in some other towns trouble was occasioned.

ATELLANÆ FABULÆ (called also *Oscan plays*), a kind of light interlude between tragedy and comedy, in ancient Rome, performed not by the regular company of actors, but by freeborn young Romans. This kind of play is said to have originated from the ancient *Atella*, a city of the Oscans, between Capua and Naples, and is at the same time the beginning and all that remains of a national Italian comedy, consisting of farce seasoned by satire.

A TEMPO (Italian, 'in time'), in music, of similar signification with *a battuta*, and, like that expression, seldom used but when the time has been interrupted.

ATH, a town of Belgium, in the province of Hainaut, on the Dender. It has various manufacturing industries, principally in weaving, dyeing, and printing cottons. It was formerly a fortress. It was taken by Louis XIV. in 1667, and by Catinat in 1697. It was restored to the Imperialists by the treaty of Ryswick; taken by the Dutch in 1706; restored by them to the empire in 1716; retaken by the French in 1745; dismantled, and restored to Maria Theresa in 1748. After the battle of Jemappes, in 1792, it became French along with the whole of Hainaut, and was restored to the Netherlands in 1815. Pop. (1890), 9868; (1904), 11,200.

ATHABASCA, a river and lake in North-western Canada, between the Rocky Mountains and Hudson's Bay. The river has its sources in the eastern slopes of the Rocky Mountains, pursues a tortuous course, at first generally to the north-east and then to the north, till it falls into Lake Athabasca; length about 600 miles. It receives the waters of the Lesser Slave River, and other tributaries. The Lake of Athabasca, or Lake of the Hills, is about 200 miles in length from east to west, and about 35 miles wide at the broadest part. Its waters are carried off by the Great Slave River, with which it communicates by several small streams that issue from its western end. The north shore of the lake is high and rocky, and thickly wooded with firs and poplars, &c.; the south shore is level. The lake abounds in fish such as trout, carp, pike, &c. The former district of Athabasca, formed in 1882, is now divided between the provinces of Alberta and Saskatchewan; area about 252,000 square miles. It is watered by the Athabasca and the Peace River, and contains the Lesser Slave Lake, and other smaller sheets. It has a considerable area of fertile soil, and the population is rapidly growing.

ATHALIAH, daughter of Ahab king of Israel, and wife of Joram king of Judah; a woman of abandoned character, and fond of power, who, after the death of her son Ahaziah, opened her way to the throne by the murder of forty-two princes of the royal blood. She reigned six years; in the seventh the high-priest Jehoiada placed Joash, the young son of Ahaziah, on the throne of his father. This prince had been preserved and brought up secretly in the temple by Jehosheba, the sister of Joram and wife of Jehoiada. Athaliah, attracted by the noise of the people who were crowding to the coronation of Joash, entered with them into the temple, where the ceremony was going on. At the sight of the new king, surrounded by priests, Levites, great officers of the kingdom, and the joyful people, she was beside herself; she tore her hair, and cried out, 'Treason!' Jehoiada ordered her to be immediately led from the temple by the officers, and commanded that all who should offer to defend her should be slain; but she was put to death at the gate of the palace without

opposition. The altars of Baal, which she had erected, were thrown down, and the worship of God restored (about B.C. 877). (See 2 Kings viii. ix.) Racine wrote a drama on this story at the request of Madame de Maintenon.

ATHAMAS, in the legendary history of Greece, the son of Æolus and Enareta, and governor of a part of Bœotia. He was the husband of Nephelē. Their children were Hellē and Phryxus. Being afterwards separated from Nephelē, he had by Ino, his second wife, Learchus, Melicertes, and Eurycleia. Ino, determining to get rid of the children of Nephelē, caused a failure of the crops, and bribed the messengers whom Athamas had sent to the oracle to inquire the cause of the misfortune, to bring for an answer that the children of Nephelē must be sacrificed. Hera had instigated her to this measure in order to destroy her, hating her because she had been the nurse of Bacchus. But the plan failed. Nephelē preserved her children by means of the golden ram, and the messengers revealed the treachery of Ino, who would have inevitably felt the vengeance of Athamas had not the grateful Bacchus conveyed away his nurse. Athamas, supposing that she was put to death, married Themisto, the daughter of Hypseus, king of the Lapithæ. But Ino returned, gained his love once more, and excited the jealousy of Themisto to such a pitch that she determined to murder Ino's children. With this view she ordered their beds to be covered with black; but Ino, suspicious of some evil design, changed the clothes, and the unconscious Themisto murdered her own children, and became a victim to despair. Others relate that Athamas, having lost his reason through the anger of Hera, and taking Ino and her children for a lioness and her whelps, seized Learchus and dashed him against a stone; that he then pursued Ino, who, with Melicertes in her arms, plunged into the sea. Stained with blood, Athamas now abandoned Bœotia and fled to Phthiotis, where he built Alos, and again united himself with Themisto.

ATHANASIAN CREED. See ATHANASIUS and CREED.

ATHANASIUS, ST., Bishop of Alexandria, a renowned father of the church, born in that city about 296. He had a Christian education, and came into the family of Alexander, afterwards archbishop of Alexandria, whose private secretary he became. He then went to St. Anthony, and led an ascetic life with that renowned anchorite, but at length returned to Alexandria, where he became a deacon. Alexander took him to the council at Nice, where he gained the highest esteem of the fathers by the talents which he displayed in the Arian controversy. He had a great share in the decrees passed here, and thereby drew on himself the hatred of the Arians. After six months he was appointed the successor of Alexander. The complaints and accusations of his enemies at length induced the Emperor Constantine to summon him in 334 before the councils of Tyre and Jerusalem. Athanasius brought to light the iniquitous arts which had been practised against him, and threw his judges, who were likewise his enemies, into such confusion that the imperial deputies could with difficulty rescue him from their anger. They could do nothing, however, further than suspend him from his office. He still continued in the discharge of his duties until the emperor, deceived by new falsehoods, banished him to Treves. The death of Constantine put an end to this banishment at the end of a year and some months. Constantius, emperor of the East, recalled the holy patriarch. His return to Alexandria resembled a triumph. The Arians made new complaints against him, and he was condemned by ninety Arian bishops assembled at Antioch. On the contrary 100 orthodox bishops, assembled at Alexandria, declared him innocent; and Pope Julius confirmed this sentence, in conjunction with more than 300 bishops assembled at Sardis from the East and West. In consequence of this he returned a second time to his diocese. But when Constans, emperor of the West, died, and Constantius became master of the whole empire, the Arians ventured to rise up against Athanasius. They condemned him in the councils of Arles and Milan, and as the worthy patriarch refused to listen to anything but an express command of the emperor, when he was one day preparing to celebrate a festival in the church 5000 soldiers suddenly rushed in to make him prisoner. But the surrounding priests and monks placed him in security. Athanasius, displaced for a third time, fled into the deserts of Egypt. His enemies pursued him even here, and set a price on his head. To relieve the hermits who dwelt in these solitary places, and who would not betray his retreat, from suffering on his account, he went into those parts of the desert which were entirely uninhabited. He was followed by a faithful servant, who, at the risk of his life, supplied him with the means of subsistence. In this undisturbed spot Athanasius composed many writings, full of eloquence, to strengthen the faith of the believers, or expose the falsehood of his enemies. When Julian the Apostate ascended the throne he allowed the orthodox bishops to return to their churches. Athanasius therefore returned after an absence of six years. The mildness which he exercised towards his enemies was imitated in Gaul, Spain, Italy, and Greece, and restored peace to the church. But this peace was interrupted by the complaints of the heathen, whose temples the zeal of Athanasius kept always empty. They excited the emperor against him, and he was obliged to flee to Thebais to save his life. The death of the emperor and the accession of Jovian again brought him back; but Valens becoming emperor eight months after, and the Arians recovering the superiority, he was once more compelled to flee. He concealed himself in the tomb of his father, where he remained four months, until Valens, moved by the pressing entreaties and threats of the Alexandrians, allowed him to return. From this period he remained undisturbed in his office till he died, 373.—Of the forty-six years of his official life he spent twenty in banishment, and the greater part of the remainder in defending the Nicene Creed. Athanasius is one of the greatest men of whom the church can boast. His deep mind, his noble heart, his invincible courage, his living faith, his unbounded benevolence, sincere humility, lofty eloquence, and strictly virtuous life, gained the honour and love of all. His writings, which are in Greek, are on polemical, historical, and moral subjects. The polemical treat chiefly of the mysterious doctrines of the Trinity, the incarnation of Christ, and the divinity of the Holy Spirit. The historical ones are of the greatest importance for the history of the church. In all his writings the style is distinguished, considering the age in which they were produced, for clearness and moderation. His Apology, addressed to the Emperor Constantine, is a masterpiece. The creed which goes under his name was not written by him, but belongs to a later time. (See CREED.) The most complete edition of his works is that published at Padua in 1777 (four vols. folio).

ATHEISM (Greek, *a* priv. and *Theos*, God), the doctrine which teaches the non-existence of God, and is opposed to *theism*, or *deism*. As a disposition or a manner of thinking in regard to religion it is the opposite of *faith* and *belief*. Atheism is always found to prevail most in the most depraved times; for

example, among the Greeks after Pericles, among the Romans after Augustus, among the French before the revolution, in the time of the *système de la nature*, &c. As men have at all times conceived very different ideas of the Supreme Being, it is evident that a great variety must have existed in the definitions of atheism: thus we find that some of the most moral and noble men have been called *atheists*, because their idea of the Divine Being did not agree with that of the multitude; for example, Socrates. Some modern speculators have denied the existence of any such doctrine as atheism; but this denial does not rest upon experience, and seems to imply no more than that an utter disbelief in a God cannot be logically or consistently held. Scripture, when it says, 'The fool hath said in his heart, There is no God', traces atheism to its true source, intimating that it is not so much an error of the understanding alone as a moral perversity originating in aversion to the restraints imposed by the notion of accountability to a supreme being.

ATHELNEY, a marsh, formerly an island, in Somersetshire, about 7 miles south-east of Bridgwater. It is formed by the junction of the rivers Parret and Tone. Alfred the Great established a fortified post here during a Danish invasion, and afterwards founded an abbey in the isle.

ATHELSTAN, King of England, succeeded his father, Edward the Elder, in 925. Though of illegitimate birth, his age and talents caused him to be preferred to the lawful children of Edward. He was victorious in his wars with the Danes of Northumberland, and the Scots, by whom they were assisted. After a signal overthrow of his enemies at Brunanburh (937) he governed in peace and with great ability. In his reign a law was passed conferring the rank of thane on every merchant who had made three sea voyages on his own account. He died in 940.

ATHENA. See MINERVA.

ATHENÆUM, the name originally applied to the temple of Athena or Minerva, at Athens, frequented by poets, learned men, and orators. Instruction was also given there to the youth, and in later times the name was applied to all places of education for the young. The same name was given at Rome to the celebrated school which Hadrian established on the Capitoline Mount. Many learned men received ample salaries for giving instruction in this institution, and that they might be enabled to study at leisure. Here also learned men assembled to exchange ideas on their writings. In fact, it was what is now called a *literary academy*. In modern times the same name is given to different establishments which are connected with higher education.

ATHENÆUS, a Greek rhetorician and grammarian, who lived at Naucratis, in Egypt, then at Alexandria, and afterwards at Rome, at the end of the second and beginning of the third century after Christ. He has left an encyclopædic work, in the form of conversation, called the Feast of the Learned (Deipnosophistæ), which is a rich but ill-arranged treasury of historical, antiquarian, philosophical, grammatical, and other knowledge. The principal editions are those of Schweighäuser, in fourteen vols. (1801–7); of W. Dindorf, in three vols. (1827); and of Meineke, in four vols. (1859–67).

ATHENAGORAS, a Platonic philosopher of Athens, a convert to Christianity, who wrote in Greek an Apology for the Christians, addressed to the Emperor Marcus Aurelius, in 177, one of the earliest that appeared. This work defends the Christians from the accusations brought against them by the heathens (of atheism, of incest, of eating murdered children, and the like), with a philosophical spirit and a lively and forcible style.

ATHENAIS, or EUDOCIA, Empress of the East, was the daughter of the Athenian philosopher Leontius, and was born at Athens it is believed about 393–4 A.D. Her father at his death left his property to his two sons, deeming the beauty and accomplishments of his daughter a sufficient portion. Athenais went to Constantinople to plead against this unjust decision. Her cause was heard by Pulcheria, sister of the Emperor Theodosius, a youth of twenty years of age. Pulcheria immediately selected her as a wife for her brother, and easily got him to approve of her choice. She was persuaded to receive baptism by the name of Eudocia. By Theodosius she had a daughter, Eudoxia, who was married to Valentian III., emperor of the West. After her daughter's marriage Eudocia made a pilgrimage to Jerusalem, from which she brought some precious relics. On her return she was indisposed to submit to the authority of Pulcheria, who virtually ruled the empire of the East. A quarrel ensued, in which Eudocia had for a time the ascendency; but the jealousy of her husband being aroused, according to the legend, the authority of Pulcheria was restored, and Eudocia was permitted to retire to Jerusalem. She was deprived of the title of empress, which she still retained, in consequence of her causing the assassination of Saturninus, chief of the domestics, who had been sent to put to death her two favourite ecclesiastics. When her daughter and granddaughters were taken prisoners by Genseric she became reconciled to Pulcheria, whose intervention on their behalf she desired to procure, and at the instance of Pulcheria she renounced the Eutychean heresy which she had adopted, and became reconciled to the orthodox church. She died at Jerusalem aged sixty-seven, or, according to some authorities, at a later age. She was the author of several works.

ATHENS (ancient Greek, *Athēnai*), the celebrated city of Greece, now the capital of the Kingdom of Greece, anciently the capital of the state of Attica and the centre of Greek culture. It was said to have been founded by Cecrops 1550 years before Christ, and in the most ancient times to have been called *Cecropia*, which name in after times was retained merely by the Acropolis. Under the government of Erichthonius it was said to have lost its old name and received that of *Athens*, most probably from its patron goddess Athena (Minerva); but its origin and early history are shrouded in darkness. (See ATTICA.) It is situated in the central plain of Attica, about 4 miles from the Saronic Gulf or Gulf of Athens, an arm of the Ægean Sea running in between the mainland of Greece and the Peloponnesus. The site is irregular, the city having been built on and around several hills which here rise from the plain, Mount Lycabettus, on the north-east, overlooking the whole. The principal eminence within the city boundary was the Acropolis, the site first built on; west from the Acropolis was a lower hill, called the Areopagus; south-west from the Areopagus was the Pnyx, and south from the Pnyx the Museum; towards the sea on the south the view was unimpeded. On the east of the city was the stream known as the Ilissus, and on the west was the Cephissus. The Acropolis was often called Polis or the city, from its having formed the original nucleus of the town, while the whole city, or sometimes only the lower city, as distinct from the Acropolis, was called Astu. In the Areopagus and the line of hills that run north and south to the west of it traces of numerous dwellings cut in the rocks have recently been found. At its most flourishing period, in the fifth century B.C., Athens was connected with its port-town Piræeus and the harbours of Piræeus and Munychia by two massive walls 550 feet apart, while a third wall ran to the less important harbour

of Phalerum. The first was considered the most convenient, and was one of the emporiums of Grecian commerce. The surrounding coast was covered with magnificent buildings, whose splendour vied with those of the city. The walls of rough stone which connected the harbours with the city were so broad that carriages could go on their top. The Acropolis contained the most splendid works of art of which Athens could boast. Its chief ornament was the Parthenon or Temple of Athena Parthenos (the Virgin). This magnificent building, which, even in ruins, has been the wonder of the world, was 228 feet long, 101 broad, and 66 high. It was built, under the administration of Pericles, on the site of a temple destroyed by the Persians, and was finished in 438 B.C. It was of the Doric order of architecture, and was built of marble, resting upon a basement of limestone. It had columns all round it, eight at either front and seventeen at the sides, counting the corner columns twice. These columns were fully 6 feet in diameter at the base, and 34 feet high. The structure was adorned both within and without with statues, reliefs, and other sculptures. Inside the temple stood the statue of Athena by Phidias, a master-piece of art, nearly 40 feet high, the unclothed portions formed of ivory, the drapery of plates of gold, the weight of which was estimated at 44 talents. The Propylæa, a magnificent building built of white marble, formed the entrance to the Acropolis, of which it covered the whole western end. A splendid marble stair, 70 feet broad, led up to the Propylæa. The chief building on the Acropolis, in addition to the Parthenon and the Propylæa, was the Erechtheum, a kind of double temple, especially sacred to Athena Polias (or Athena, guardian of the city), and Erechtheus, or Poseidon. It contained several very highly venerated objects, such as the ancient statue of Athena Polias, made of wood that fell down from heaven, the sacred olive-tree that Athena called forth from the earth, the well of salt-water produced by Poseidon, and the tombs of Erechtheus and Cecrops. On the Acropolis also were other temples, altars, statues, &c., including a colossal bronze statue of Athena Promachos, 50 or 60 feet high. On the south slope of the Acropolis were the theatre of Dionysus, the Odeum of Pericles, and the later Odeum of Herodes, the latter two buildings being intended for musical competitions. In the lower city the greatest pieces of architecture were the temples of Theseus and Olympian Zeus, one of which stood on the north-west, the other on the south-east side of the Acropolis. The first was of Doric architecture, and resembled the Parthenon. On the metopes of this temple the famous deeds of Hercules and Theseus were excellently represented. The temple of Zeus Olympius was of Corinthian architecture, and was the largest temple in Athens, and the greatest ever erected to the supreme deity of the Greeks. It was commenced by Pisistratus, and was continued from time to time until at length, after 700 years, it was finished by Hadrian. The outside of this temple was adorned by 120 fluted columns, 60 feet high, and 6 feet in diameter. It was 354 feet long and 171 broad. Other structures deserving of notice were the Horologium of Andronicus Cyrrhestes or the 'Temple of the Winds,' the choragic monument of Lysicrates, and the Stoa Poikilē or gallery of paintings. Besides these wonderful works of art Athens contained many other places which must always be interesting from the recollections connected with them. Such a spot was the renowned Academy where Plato taught, lying about 6 stadia north of the city, and consisting of a gymnasium surrounded by walks, groves, and fountains. Such a place was the Lyceum, where Aristotle taught, and which, through him, became the seat of the Peripatetic School. It lay on the bank of the Ilissus, opposite the city, and was also used for gymnastic exercises. Not far from thence was the less renowned Cynosarges, where Antisthenes, the founder of the Cynic School, taught. The sects of Zeno and Epicurus held their meetings in the city. Zeno chose the well-known Poikilē, and Epicurus established himself in a garden within the walls, for he loved both society and rural quiet. Not only literary, but political assemblies gave a particular interest to different places in Athens. Here was the court of Areopagus, where that illustrious body gave their decisions; the Prytaneum or senate-house; the Pnyx, where the free people of Athens deliberated. After twenty-three centuries of war and devastation, of changes from civilized to savage masters, have passed over this great city, its ruins still excite astonishment. The northern wing of the Propylæa is still tolerably perfect, and the inner wall, with its five gateways leading into the Acropolis, still stands. The Parthenon remained almost entire till 1687, when it was much injured by an explosion of gunpowder during the siege of Athens by the Venetians. It is now a magnificent ruin. Its two pediments represented respectively the contest of Poseidon and Athena for Athens and the birth of the goddess, while the metopes represented a number of events in which the goddess or heroes connected with Athens took part. A great number of these sculptures are now in the British Museum. (See ELGIN MARBLES.) In the whole of this mutilated building we find an indescribable expression of grandeur and sublimity. Near the Propylæa is the small but elegant temple of Nikē Apteros (Wingless Victory), which having been destroyed in 1687, was re-erected in 1835 from its remains. There are also astonishing remains to be seen of the Erechtheum, especially the beautiful female figures called Caryatides, supporting the roof of the southern portico. The Temple of the Winds is still tolerably perfect. Its form is an octagon: on each side it is covered with reliefs, which represent one of the principal winds. The choragic monument of Lysicrates also remains. It consists of a pedestal surrounded by a colonnade, and is surmounted by a dome of Corinthian architecture. Outside of the city our wonder is excited by the lofty ruins of the temple of the Olympian Zeus. Of 120 pillars sixteen remain, but none of the statues are in existence. The pedestals and inscriptions are scattered here and there, and partly buried in the earth. The main body of the temple of Theseus has remained almost entire, and it now contains a collection of ancient sculpture. On the hill where the famous court of Areopagus held its sittings are to be seen steps hewn in the rock, places for the judges to sit, and over against these the stations of the accuser and the accused. The hill became a Turkish burial-ground, and is covered with monuments. The Pnyx, the place of assembly for the people, not far from the Areopagus, is very nearly in its primitive state. One may see the place from which the orators spoke hewn in the rock, the seats of the scribes, and at both ends the places of those officers whose duty it was to preserve silence, and to make known the event of public deliberations. The niches are still to be seen where those who had any favour to ask of the people deposited their petitions. The spot occupied by the Lyceum is only known by a quantity of fallen stones. The ground occupied by the gardens of the Academy is now within the city limits. The long walls are totally destroyed, though the foundations are yet to be found on the plain. The Piræeus has scarcely anything of its ancient splendour, except a few ruined pillars scattered here and there, though it promises to become a handsome modern town, and has again a harbour filled with shipping,

engaged in carrying on a considerable trade. The most thorough investigation of the places among the ruins of Athens worthy of attention is contained in Leake's Topography of Athens, with some Remarks on its Antiquities (London, 1821, with an atlas in folio; second edition, London, 1841). Other valuable works on the same subject are such as Stuart and Revett's Antiquities of Athens (London, 1762–1816, four vols. folio), Dodwell's Tour through Greece, Wordsworth's Athens and Attica, Curtius's Attische Studien, Dyer's Ancient Athens, and Wachsmuth's Die Stadt Athen in Alterthum. Ancient Athens is believed to have had a population of not more than 200,000 at most.

Athens was at no time so splendid as under the Antonines, when the magnificent works of from eight to ten centuries stood in view, and the edifices of Pericles were in equal preservation with the new buildings. Plutarch himself wonders how the ancient structures could retain such a perpetual freshness. Pausanias, who travelled in Greece at this time, that is, in the second century after Christ, has left a valuable account of the state of Athens as he saw it. Many of the edifices of later times were due to foreign potentates, rulers of Pergamus, of Egypt, of Rome. But after a time the wholesale robberies of collectors, the removal of great quantities of the works of art first to Rome and then to Constantinople, Christian zeal, and the attacks of barbarians, made sad inroads among the monuments. When Justinian closed the schools of the philosophers in 529, Athens soon ceased to be a centre of intellectual activity. The Parthenon was turned into a church of the Virgin Mary, and St. George stepped into the place of Theseus. In 1456 Athens fell into the hands of the Turks, under whom the Parthenon became a mosque. Latterly it had sunk to a miserable condition, and when it was selected as the capital of the modern kingdom in 1833, it had only a scanty population inhabiting a scene of ruins. The progress it has since made is really remarkable.

Modern Athens lies mostly northwards and eastwards from the Acropolis, and consists mainly of straight and well-built streets, limestone and marble being commonly employed as building materials. Among the principal buildings are the royal palace, the university, the academy of science and art, the polytechnic, the national museum, the observatory, the chamber of deputies, exhibition buildings, new theatre, and new library. The palace (1838–43) is a conspicuous but unattractive building of limestone with marble portico. The university is a handsome structure, with a large number of teachers and an attendance of over 3000 students. The academy is a beautiful building faced with Pentelic marble, the new national library is also a fine building, and so is the polytechnic school, part of which is occupied as a museum, and contains the Schliemann and other collections. Few of the churches are remarkable or interesting. St. Nicodemus, the largest and finest of the Byzantine churches (62 feet long by 45 wide), dates from the 11th century. Athens is well equipped with educational institutions, possessing, besides the university and polytechnic school, a number of high schools, a gymnasium, a school for the higher education of girls and female teachers, orphanages for boys and girls, and four foreign archæological schools or institutes, the French, German, American, and British. Athens is a thriving town, with tramways in the principal streets, and is connected by railway (6 miles) with its port, the Piræus, the line being continued by way of Corinth to Nauplia and Patras. Pop. (1871), 44,510; (1907), 167,479.

ATHENS, the name of a number of places in the United States, the chief being in Georgia, 63 miles east-north-east of Atalanta. It contains the Georgia University. Pop. (1900), 10,245.

ATHERSTONE, a town of England, in Warwickshire, 8 miles south-east of Tamworth. Besides the parish church there are a Roman Catholic and several other places of worship, and a free grammar-school founded in 1573. It has manufactures of hats. Pop. of parish (1901), 5248.

ATHLETES (Greek, *athlētai*), combatants who took part in the public games of Greece; also young men who went through the gymnastic exercises to harden themselves and to become fit to bear arms. In a narrower sense the athletes were those who made the athletic or gymnastic exercises their principal business, particularly wrestlers and boxers. The business of athletes was to contend at the public festivals; and they regulated their habits of life with reference to this purpose. Not only the applause of the people, but also crowns and statues, were conferred upon the victor. He was led in triumph; his name was written in the public records; and poets sang his praise. He also received peculiar privileges, had a yearly pension, and the foremost seat at the sacred games. Particular honours were conferred on him by his native city, for all his fellow-citizens partook of his glory. See GAMES.

ATHLONE, a town of Ireland, partly in Westmeath, partly in Roscommon, on the Shannon, about 67 miles west by north of Dublin. It is divided by the river into two nearly equal parts, which communicate by a handsome stone bridge of five arches. Its position near the centre of Ireland has led to its selection as one of the chief depôts for troops and military stores. The barracks, occupying a height above the river, can accommodate 1500 men, and have attached an ordnance yard, magazines, and armoury provided with 15,000 stand of arms. By means of a canal the Shannon has been rendered navigable for 71 miles above the town, which being also the terminus of four important railways carries on a brisk trade. The chief industrial establishment is an extensive woollen factory, and there are also large sawmills. Pop. in 1891, 6742; in 1901, 6617.

ATHOL, or ATHOLE, a mountainous and romantic district, situated in the north of Perthshire, Scotland. It contains several lakes and richly cultivated valleys. There are no towns, but many villages lie interspersed throughout the country. Athol gives the title of duke to a branch of the house of Murray, and the duke owns the greater part of the district.

ATHOS, now *Hagion Oros* or *Monte Santo* (Holy Mountain), a high mountain, in the province of Salonica, in European Turkey, forming the extremity of a long chain of mountains which runs through a peninsula jutting into the Archipelago. The peninsula is about 30 miles long and 5 miles broad. It is covered with forests of various kinds of trees, and with vineyards and plantations of olive and other fruit-trees. The surface is very irregular, and the coast displays numerous creeks and inlets of the sea. In ancient history the peninsula is mentioned chiefly on account of the shipwreck which here befell the Persian fleet under Mardonius in 493 B.C., and on account of the canal which, in order to avoid a similar calamity, Xerxes caused to be cut through the isthmus that joins the peninsula to the mainland. This work was executed about 483 B.C., and three years later the Persian fleet of over 1300 triremes passed through. Traces of this canal are still to be seen, after more than 2300 years. The whole peninsula, as well as the mountain, which is about 6700 feet above the level of the sea, receives the name of Athos. On the peninsula there are situated about twenty monasteries, and a multitude of hermitages, which contain about 6000 monks and hermits, of

the order of St. Basil. These live here in a perfect separation from the world, and under such strict regulations that they do not tolerate any female creature, not even of the class of domestic animals, among them. They are also extremely industrious: they diligently cultivate the soil, they grow vines and olives, vegetables, &c., and actively engage in fishing, and they also carve statues of the saints, *Agni Dei*, crucifixes, rosaries, &c., which they send to the small town of Karyes, on the mountain, where weekly markets are held, and to the rest of Europe, especially to Russia. They also collect alms to pay their heavy yearly tax to the Porte. There is an academy in which the younger monks receive instruction in various subjects. The libraries of the monasteries are rich in literary treasures, particularly in manuscripts, partly procured from Constantinople before its conquest by the Turks, partly presented to them from the same place, and partly written by the laborious monks. Many books have been brought thence to the great collections at Paris, Vienna, &c., and the rest are but little used among the monks themselves. Their monasteries and churches are the only ones in the Ottoman Empire which have bells. Every nation belonging to the Greek Church has here one or more monasteries of its own, which are annually visited by pilgrims from Russia, Servia, Bulgaria, &c., as well as from Greece, Asia Minor, and Constantinople. The privileges which the members of the various establishments enjoy they owe to Murad II., who, on account of their voluntary submission, even before the capture of Constantinople, granted them his protection. At the present day no Mohammedan, the kaimakam or chief Turkish official excepted, who acts as an intermediary between the monks and the sultan, can settle on the peninsula. The whole of the religious communities form a kind of republic, the government of which is carried on by the synod of Karyes, the finely-situated capital of the peninsula, where the kaimakam resides. The synod consists of twenty deputies (one from each monastery) and four presidents. The synod meets once a week, the presidents forming a standing committee, and has to attend to religious discipline, as well as to manage the financial affairs of the whole community. Hermits were established on Athos in the middle of the ninth century, and the first monastery, that of St. Lavra, was founded by the monk Athanasius in 968.

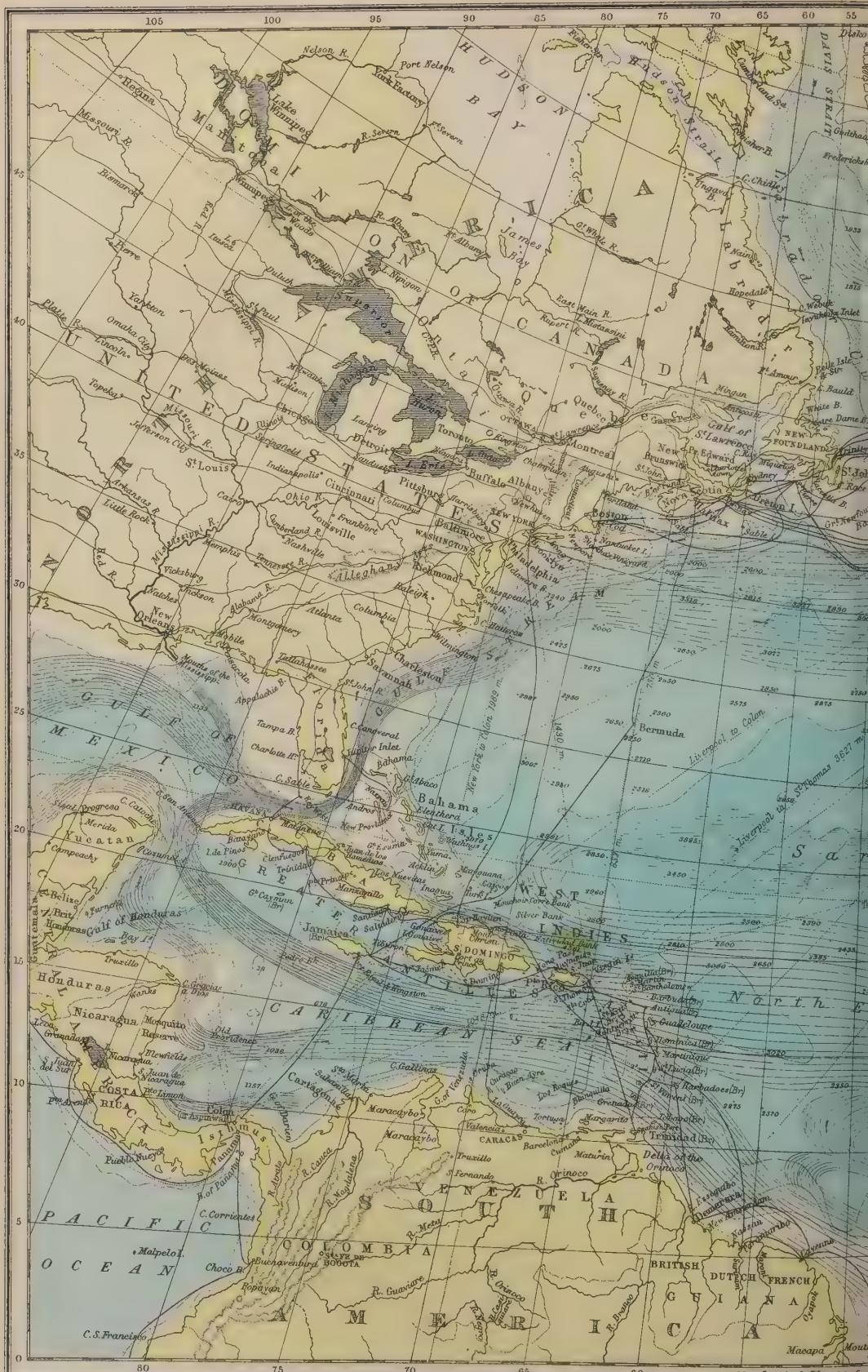
ATHWART-HAWSE, the situation of a ship when she is driven by the wind, tide, or other accident, across the forepart of another. This phrase is equally applied when the ships bear against each other, or when they are at a small distance, the transverse position of the former to the latter being principally understood.

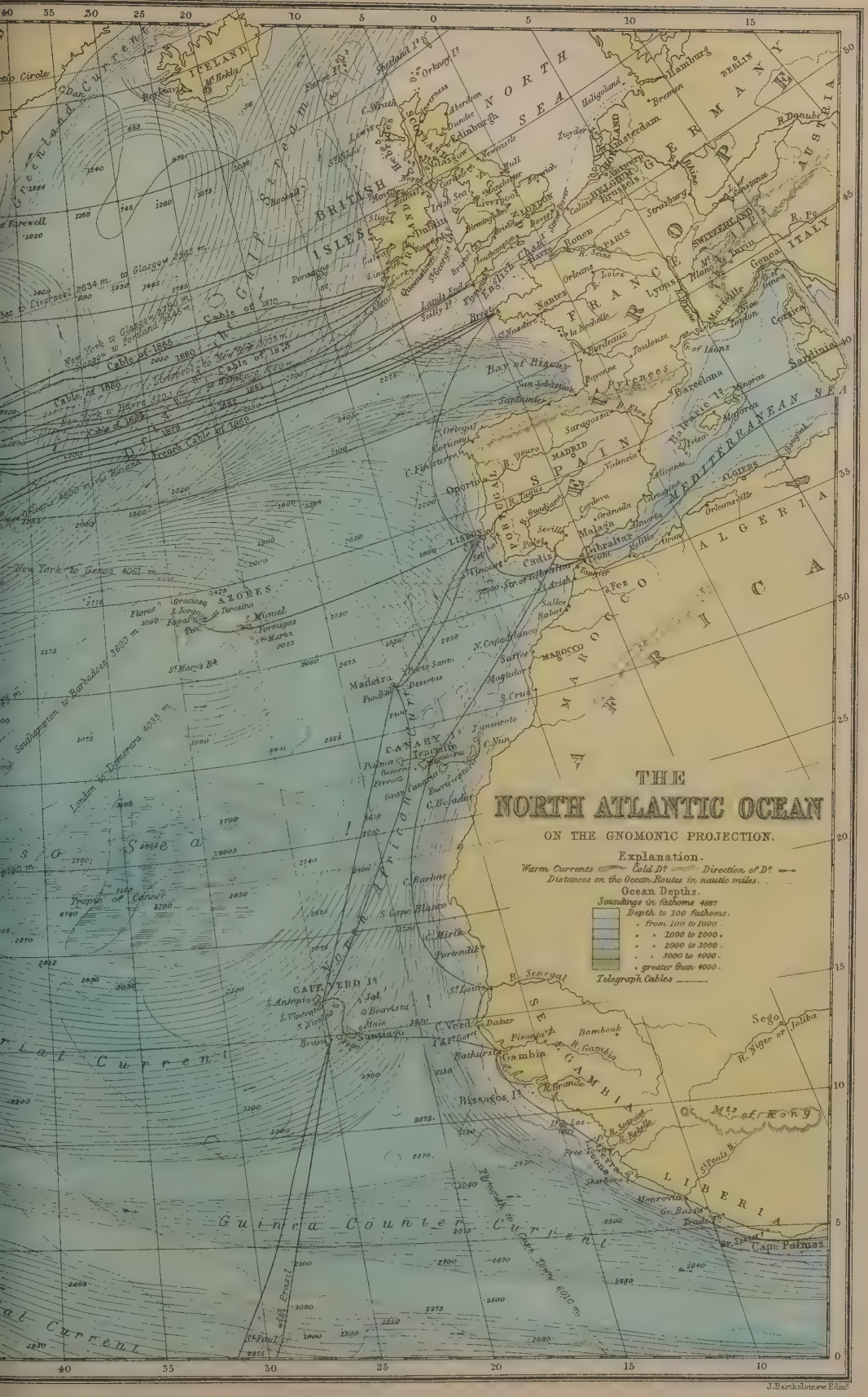
ATHY, a market-town in Ireland, county of Kildare, 37 miles south-west of Dublin, on the Barrow, which is navigable to its mouth, and is here joined by the Grand Canal. The town has Protestant and Roman Catholic churches, extensive county jail, police barracks, &c. It has a large trade in corn, by canal and river, and is an important railway-station. Pop. in 1891, 4866; in 1901, 3599.

ATLANTA, a city in the United States, the capital of Georgia, on an elevated ridge, 7 miles south-east of the Chattahoochee River. It is a most important railway centre, and one of the most flourishing cities of the Southern States, having a large trade in agricultural produce and in the articles of its manufacture, its industrial establishments including large rolling-mill and nail factory, foundries, agricultural implement works, flour-mills, paper-mills, railway works, &c. There are numerous churches, some of them fine buildings, a splendid hotel, handsome state-house, &c. Its educational institutions include Oglethorpe University, Atlanta medical college, North Georgia female college, &c. Atlanta suffered severely during the civil war, but latterly has rapidly increased. Pop. (1900), 89,872; (1910), 154,839.

ATLANTIC OCEAN, the name given to the vast expanse of sea lying between the west coasts of Europe and Africa, and the east coasts of North and South America, and extending from the Arctic to the Antarctic Seas. Its greatest breadth is between the west coast of Northern Africa and the east coast of Florida in North America, the distance here being 4150 miles. If the Gulf of Mexico, in reality one of its bays, be included, it will extend to 5000 miles. Its least breadth, which is between Norway and Greenland, is about 930 miles. Between Cape St. Roque, Brazil, and Sierra Leone, the breadth is 1730 miles. Its superficial extent has been estimated at 25,000,000 square miles. From the number and extent of its inlets, gulfs, and bays, its coast-lines are of great length, the east being upwards of 32,000 miles, and the west upwards of 55,000. Its principal inlets and bays are Baffin's and Hudson's Bays, the Gulfs of Mexico, Honduras, and San Juan, the North Sea or German Ocean, the Bay of Biscay, and the Gulf of Guinea. The principal islands north of the equator are Iceland, the Faroe and British Islands, the Azores, Canaries, and Cape de Verd Islands, Newfoundland, Cape Breton, and the West India Islands; and south of the equator, Ascension, St. Helena, Trinidad, Columbus, and Tristan da Cunha, the last three being mere rocks.

The great currents of the Atlantic are of two kinds, the *drift-currents* and the *stream-currents*. Drift-currents are produced by the wind, either by the perpetual or trade winds, or by prevailing winds. Those having the former origin are constant, running always in the same direction, and generally with a nearly equal velocity; those having the latter are not so constant, neither do they always run in the same direction, nor at a similar rate. The drift-currents produced by the trade-winds are found between the tropics; those resulting from prevailing winds, north and south of the parallels of 30°. Stream-currents are due indirectly to the influence of winds, being produced by drift-currents, of which they are continuations. As these currents travel for great distances they meet with many obstacles in their course, which result in changes of direction. A stream-current may thus be successively propelled by different currents, or consist in the combination of different stream-currents. A third kind of current is produced by the flow of the water to restore the level disturbed by other currents. This is called a *current of indraught*. (See CURRENTS (MARINE), and OCEAN.) The great currents of the Atlantic are the Gulf-stream, the equatorial current—which may be divided into the main equatorial current, the northern equatorial current, and the southern equatorial current—the North African and Guinea current, the Southern connecting current, the Southern Atlantic current, Cape Horn current, Rennel's current, and the Arctic current. (See the map of the North Atlantic.) The Gulf-stream is a continuation of the main equatorial current, and partly of the northern equatorial current, both westward drift-currents produced by the trade-winds. The former passes across the Atlantic to the American coast, upon which it strikes from Cape St. Roque to the Antilles. On being turned by the coast it runs along it at a rate of 30 to 50 miles per day, and sometimes at a higher speed, till it enters the Gulf of Mexico, from which, having previously received part of the waters of the northern equatorial current, it issues between Florida and Cuba under the name of the Gulf-stream. It afterwards flows nearly parallel


HUDSON BAY
BRITISH NORTH AMERICA
DOMINION OF CANADA
UNITED STATES OF AMERICA
GULF OF MEXICO
CARIBBEAN SEA
WEST INDIES
GREATER ANTILLES
Bahama Islands
Bermuda
Yucatan
Honduras
Nicaragua
COSTA RICA
Isthmus of Panama
Gulf of Honduras
Jamaica
S. DOMINGO
Trinidad
CARACAS
VENEZUELA
COLOMBIA
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
PACIFIC OCEAN
Hudson Strait
Davis Strait
Labrador
Quebec
Montreal
Toronto
Ottawa
Boston
New York
Baltimore
Washington
Philadelphia
Richmond
Chicago
St Louis
Cincinnati
Pittsburg
Buffalo
Albany
New Orleans
Mobile
Charleston
Savannah
Havana
Mexico
Panama
Bogota
Lima
Liverpool to Colon
New York to Colon 1969 m.
Liverpool to St Thomas 3627 m.
Longitude West 50 fro



J. Bartholomew Edinr.

to the coast of the United States, separated from it by a belt of cold water. Off Cape Hatteras it spreads into an expanding channel, reaching a breadth of 167 miles, and consisting of three warm sections with two cold belts interposed. On passing Sandy Hook it turns eastward, and continues to be recognizable, partly by a blue colour derived from the silt of the Mississippi, till about 30° w. lon., where, with a greatly diminished temperature, it is found flowing nearly due east. The equatorial current, so called from its being under the line, commences on the west coast of Africa, about lat. 10° s., or nearly opposite St. Paul de Loando. From this point it pursues a north-west direction till it makes 0° lon., when it proceeds due west on both sides of the equator, till it arrives at Cape St. Roque in South America, when it is divided into two branches, one running along the Guiana coast, and into the Gulf of Mexico, as already mentioned, the other along the coast of Brazil, and so called the Brazil current. The latter is reinforced by the southern equatorial current, which, however, is not distinctly separable from the main equatorial current. The length of the equatorial current, from the coast of Africa to Cape St. Roque, is 2500 miles. Its breadth near the commencement is 185 miles; opposite Cape Palmas, 420; and before dividing, about lon. 31° or 32° w., it is 510. Its average velocity, which is greater in summer than in winter, is from 25 to 30 miles a day. The North African and Guinea current originates between the Azores and Cape Finisterre in Spain. It flows in a south-east direction, and after sending a mass of water into the Mediterranean it pursues a south course to Cape Mesurada, south of Sierra Leone, keeping at a considerable distance from the land. It then flows rapidly for 1000 miles due east, to the Bight of Biafra, where it seems to mingle with the equatorial current. It is fed from the west by the Guinea counter current, a back flow of water between the main and the northern equatorial currents. The southern connecting current strikes across the South Atlantic from the Brazil current, then turns northwards, and finally joins the great equatorial current. The South Atlantic or South African current originates north of the Cape of Good Hope, from which it flows in a north-west direction, at a rate of from 15 to 30 miles a day, and eventually merges into the equatorial current. Cape Horn current flows constantly from the Antarctic and South Seas into the Atlantic Ocean, its general direction being E.N.E. and north-east. Rennel's current, which is possibly a continuation of the Gulf-stream, enters the Bay of Biscay from the west, curves round its coast, and then turns north-west towards Cape Clear in Ireland. The Greenland or Arctic current runs along the east coast of Greenland to Cape Farewell; having doubled this cape, it flows up towards Davis' Strait, from which it receives an inflow of water, and then turns to the south along the coast of Labrador, and continues along the coast of the United States, from which it separates the Gulf-stream by a cold band of water. Immense masses of ice are borne south by this current from the Polar seas, and carried into warmer regions, where they gradually dissolve and disappear. In the interior of the North Atlantic there is a large area comparatively free from currents, lying between 20° and 30° N. and 30° to 60° W. It is called the Sargasso Sea, from the large quantity of sea-weed which drifts into it. (See GULF WEED.) A similar area exists in the South Atlantic, to which the same name is occasionally applied by analogy, though it is destitute of sea-weed. It extends between 20° and 30° S. and 0° and 25° W. Besides the surface currents, recent investigation has established the existence of a general oceanic circulation, consisting of an under current of cold water flowing from the poles to the equator, and an upper current of warm water from the equator to the poles. (See CURRENTS—MARINE.) The winds of the Atlantic are not peculiar to that ocean, but identical with those that prevail in the same latitudes in the other seas around the globe. The most remarkable of these are the perennial or trade winds, which blow constantly in one direction, namely, from east to west, or nearly so. They extend generally to 28° on each side of the equator, but are divided by a tract of sea, usually occupying a width of from 6 to 8 degrees of latitude, in which calms and variable winds prevail. The tract of the trade-winds to the north of this zone, which is almost always found on the north side of the equator, is called the region of the north-east trade-wind, from blowing one or two points north of east; that to the south, the region of the south-east trade-wind, from blowing south of east. The north-east trade-wind blows with less steadiness than the south-east, but towards the West India Islands it keeps generally steady between east and north-east. The trade-winds are constant only at a considerable distance from land, and become more steady the greater the expanse of water over which they blow.

The greatest depth yet discovered in the Atlantic is to the north of the island of Porto Rico, in the West Indies, namely, 27,366 feet. Formerly depths of 40,000 or 50,000 feet were reported, but this was owing to defective sounding apparatus. The geography of the ocean-bed is now pretty well known, especially in the North Atlantic, where the laying of the telegraphic cables and the soundings connected therewith have thrown a great deal of light on the conformation and character of the bottom at different points. Cross-sections of the North Atlantic between Europe and America show that its bed may be represented as exhibiting two great valleys lying in a north and south direction, and separated by an intervening ridge. Each of these valleys is about 500 miles in width. The mean depth of the eastern valley is about 14,000 or 15,000 feet, and it can be traced from the equator to the latitude of the Faröes, where it terminates, or over an extent of 3700 miles. The western valley has a maximum depth of 16,800 feet, and can be traced from the latitude of the Azores as far north as Greenland, where it bifurcates, the deeper portion pointing northwards up Baffin's Bay. The submarine ridge dividing these two valleys appears to be very uniform in depth below the surface, having 1600 fathoms of water above it from the Azores to the latitude of the Hebrides. It then rises gradually till at last it culminates in Iceland. On this plateau the Atlantic telegraph cables have been laid, and from it the first specimens of deep-sea mud were brought up. This was found on examination by the microscope to consist to a large extent of calcareous shells (Foraminifera), not water-worn, but quite perfect, showing that the water at such depths can have little or no motion. No sandy particles were found in the mud. The South Atlantic is not so well known as the North, but so far as soundings yet prove it has not a greater depth than the latter, the greatest depth found being 2900 fathoms, in S. lat. 28°. It would appear to be separated from the North Atlantic by a rocky ridge, on which rest the islands of Ascension, Fernando de Noronha, and St. Paul. The saltness and specific gravity of the Atlantic differ in various parts, and gradually diminish from the tropics to the poles, and also from within a short distance of the tropics to the equator. In the neighbourhood of the British Isles the salt has been stated at one thirty-eighth of the weight of the water.

ATLANTIC TELEGRAPH See TELEGRAPH (ELECTRIC).

ATLANTIDES, in architecture, pillars, shaped like men, used to support some projection, as a cornice. See CARYATIDES.

ATLANTIS, among the ancients, the name of an island in the Atlantic, of which vague accounts had been received from ships which had ventured into the ocean. The descriptions of its situation were very indefinite, and, as they placed it in a spot where afterwards no island was found, it was supposed that it had sunk. But some persons imagine that Phœnician or Carthaginian merchant ships, being driven out of their course by storms and currents, were forced over to the American coasts, from which they afterwards fortunately returned to their country; and that, therefore, the island of Atlantis mentioned by Plato, as well as the great nameless island spoken of by Diodorus, Pliny, and Arnobius, was nothing more than what is now called America. The most circumstantial account of the island of Atlantis is in Plato's Timæus and his Critias; but the particulars are no doubt mainly his own invention.

ATLAS, in the Greek mythology, the name of a Titan, son of Iapetus and Clymene. Zeus, the conqueror of the Titans, condemned him to bear the vault of heaven. He was endowed with wisdom, and later accounts ascribe to him much knowledge, particularly of astronomy. By Pleione, the daughter of Oceanus, he had seven daughters, who, under the name of *Pleiades* (called likewise, after their father, *Atlantides*), shone in the heavens. According to some, he was also the father of the Hyades.—*Atlas*, in anatomy, is the name of the first vertebra of the neck, which supports the head.—*Atlas*, in the sense of a collection of maps and charts, is derived from the Atlas who supported heaven. This name was first used to signify a geographical system, by Gerard Mercator, in the sixteenth century.

ATLAS, MOUNT, an extensive mountain system in North Africa, which at its south-western extremity commences near Cape Nun, on the Atlantic coast, and after traversing Marocco, Algiers, and Tunis, terminates on the coast of the Mediterranean Sea, about lon. 11° E. The general course of these mountains is from W.S.W. to E.N.E.; but they do not consist of one continuous and definite range, but of a congeries of elevations; sometimes isolated, and sometimes connected, with numberless branches and offsets, irregularly diffused over nearly the whole north-western portion of Africa. The Atlas Mountains have been divided generally into two principal and parallel ranges, running W. to E., the one called the Greater, and the other the Lesser Atlas; the latter lying towards the Mediterranean, and the former adjoining the Sahara or Great Desert, from which it is separated by low sandy hills. The entire course of the principal chain may be reckoned at about 1500 miles, measured from Cape Nun, on the Atlantic, to Cape Bon or Ras Iddah, on the Mediterranean. Little is definitely known of the heights of the Atlas Mountains; in some places, however, they rise above the line of perpetual snow, and in many approach it. The culminating point so far as known appears to be Jebel Ayashin, in the heart of Marocco, estimated at 14,600 feet. Miltsin is calculated to be 11,400 feet high, and Joseph Thomson in 1888 ascended a peak 13,150 feet high. The general altitude of the mountains is moderate, as they do not shoot up into lofty peaks like the Alps, but consist principally of broad ridges and rounded summits. Our knowledge of the geology, botany, and mineralogy of the Atlas range is still very imperfect. Granite, gneiss, and schist, appear on the higher peaks, and the lower parts of the ridges are formed by secondary limestone; while, as to botany, we know that the vegetation is chiefly European in character, except on the low grounds and next the desert. Silver, antimony, lead, copper, iron, &c., are among the minerals. These mountains possess a classical celebrity from the frequent mention made of them by the ancients, and the exaggerated notion which they seem to have entertained of their elevation.

ATMOSPHERE, primarily the gaseous envelope which surrounds the earth. The telescope and spectroscope have, however, revealed the existence of atmospheres surrounding the sun and the planets. The atmosphere of the earth consists of a mass of gas resting on its surface. By its weight the air presses on every part of the surface with a pressure equal to that which would be experienced at the bottom of an ocean of water 32½ feet deep. We are, however, so habituated to this pressure that we do not recognize it by our feelings under ordinary circumstances, and in proof of its existence require special experiments devised for the purpose of showing it. Still, the senses themselves may readily be made to perceive it, or rather to perceive any alteration in it. Thus, on being rapidly lowered into a deep mine the pressure increases so quickly that one cannot fail to observe a sensation of pressure in the ears and eyes; and the decrease of pressure on rapidly rising in a balloon from the earth's surface sometimes gives rise to great pain.

Experiments with the air-pump easily demonstrate the existence of the pressure of the atmosphere; the proof of it was, however, first given by Torricelli, and by Pascal's celebrated 'crucial experiment'. Torricelli recognized that the reason why the water ascends in the bore of a pump when the piston is raised is that the piston relieves the water inside the bore from the atmospheric pressure, and that the pressure of the atmosphere on the surface of the water outside the pump-tube forces the water downwards outside, and therefore upwards inside, the tube. Guided by this idea he constructed the first barometer. (See BAROMETER.) Pascal, in order to verify Torricelli's explanation, carried a barometer up the Puy de Dôme, a mountain of Auvergne, on the principle that, as he ascended from the earth's surface, the pressure ought to decrease, supposing it due to the weight of the atmosphere. The mercurial column, which, according to Torricelli's theory, is supported on account of the difference of pressure on the upper surfaces inside and outside the barometer tube, ought therefore also to diminish in height as the mountain is ascended. The experiment, when tried, completely confirmed Torricelli's notion.

The average height of the mercurial column at the sea-level is a little less than 30 inches. This corresponds to a pressure of about 14·6 lbs. per square inch. The pressure on a square foot is nearly a ton. On the human body of average size there is a distributed inward pressure of over 14 tons. This is balanced, of course, by the outward pressure of the fluids of the body, as may be seen when any such experiment as the surgical operation of cupping is tried. The atmospheric pressure varies from day to day, and from hour to hour. (See METEOROLOGY.) Its limits, except in very extraordinary cases, are 27½ and 31 inches of mercury, or 13½ and 15½ lbs.

The atmosphere consists of a mixture of oxygen and nitrogen in the proportion of 20·81 volumes of oxygen to 79·19 volumes of nitrogen according to the very careful analyses of Dumas and Boussingault; or, by weight, 23·01 parts of oxygen to 76·99 of nitrogen. The most exact experiments have not detected any variation from these proportions in different specimens of air collected at different parts of the earth's surface, or collected during balloon

journeys, the gases being associated together, not as a chemical compound, but as a mechanical mixture. Recently, however, it has been discovered that the nitrogen contains a small quantity of a gas named *argon*, and the air also contains minute quantities of other gases. Aqueous vapour, in variable quantity, carbonic acid gas, traces of ammonia, and, in towns, sulphuretted hydrogen and sulphurous acid gas are always to be found. These are reckoned impurities, and some of them are deleterious.

Philosophers have discussed the question of the *limits of the atmosphere*. Wollaston, Delambre, Herschel, and others, on particular suppositions, have variously estimated its height from 45 to 212 miles. From what we now know, however, it appears impossible to assign any limit whatever to its height, if by that we mean the height at which we should cease to find the gases of which it is composed. We know nothing whatever of the reflective and refractive powers (which give rise to the phenomenon of twilight), or of the conducting power for electricity (on which, it is supposed, the phenomena of the Aurora depend) in the case of gases attenuated as they would be at these enormous heights.

ATMOSPHERIC RAILWAY, so called in consequence of the motive power being derived from the pressure of the atmosphere. The idea of obtaining motion by this means appears to have been first suggested by the celebrated French engineer Papin, about 200 years ago. The suggestion was disregarded until the 19th century, when it was successively taken up by Messrs. Lewis, Medhurst, Vallance, and Pinkus, and lastly by Mr. Clegg, who in conjunction with Mr. Jacob Samuda brought it to a practical issue. In 1810, and again in 1827, Mr. Medhurst published a scheme for 'Conveying Letters and Goods by Air,' the principles of which were—first, the construction of an air-tight tunnel of sufficient magnitude to admit the passage of carriages within it, running upon iron rails, and propelled by forcing in air behind them by pumping machinery, the carriages being made so nearly to fit the tunnel that the air thus forced in could not pass them, but must act upon them as upon a piston; secondly, the propulsion of such carriages, in certain cases, in the opposite direction, by exhausting the tunnel in front of them instead of forcing in air behind them. In 1825 a similar project was patented by Mr. Vallance of Brighton for the conveyance of passengers, and some experiments made at Brighton proved the practicability of the idea; but the objections against travelling in a dark close tunnel would have been sufficient of themselves to prevent its general adoption. About the year 1835 Mr. H. Pinkus, an American gentleman residing in England, obtained a patent for what he termed a Pneumatic Railway. In this the carriages were to travel on an open line of rails, along which a cast-iron tube of between 3 and 4 feet diameter was to be laid, having a longitudinal slit from 1 to 2 inches wide along its upper side, through which a connection could be formed between the leading carriage and a piston working within the tube. The slit was to be closed by a flexible valve, and the piston being impelled forward by the pressure of the atmosphere in its rear, whenever, by the action of pumping machinery connected with the tube a partial vacuum was formed in front of it, the connecting-rod, as the piston advanced, opened the valve to admit the air behind it; and after the passage of the connecting-rod, the valve was restored to its place and firmly pressed down by a wheel or roller also connected with the piston. This method, with some improvements in the details, was adopted by Messrs. Clegg and Samuda, who in 1840 tried some experiments on a large scale on a portion of the West London Railway. A tube 9 inches in diameter, and ½ mile in length, was laid down, and on a gradient of 1 in 115 a maximum speed of 30 miles per hour was obtained with a load of more than 5 tons. The success of these experiments induced the government to advance a loan to the Dublin and Kingstown Railway Company, to enable them to construct an extension on the pneumatic principle from Kingstown to Dalkey, a distance of about 1¾ mile, the gradients and curves of which rendered it unsuitable for locomotives. In this railway the vacuum-pipe was about 15 inches in internal diameter, and was laid down between the two rails. The air was pumped out by means of a double-acting pump, with 5½ feet cylinders, at Dalkey. The line was opened for passenger-traffic at the end of 1843, and was worked for many months with regularity and safety throughout all the vicissitudes of temperature which occurred. The London and Croydon Company subsequently obtained parliamentary powers for laying down a line of atmospheric railway by the side of their other line from London to Croydon, and on the part that was completed by the autumn of 1845 experimental trips were run, in which a speed of 30 miles an hour was obtained with a train of sixteen carriages, and of 70 miles with six carriages. The success of the principle was complete, but during the intense heat of the summer of 1846 the iron tube, by exposure to the sun, frequently became so hot as to melt the composition which sealed the valve, so that the vacuum could not be maintained, and the line had to be worked by locomotives. Some other short lines were constructed on the atmospheric principle, but the mechanical difficulty of commanding a sufficient amount of rarefaction gradually led to the abandonment of the system for railway purposes. It has been revived, however, for the conveyance of letters and parcels in towns by means of tubes of moderate diameter laid beneath the streets. In London for some years the mail bags were thus conveyed from Euston Station to the General Post Office; but now only telegraphic messages, letters, &c., are conveyed by means of pneumatic tubes in London. See PNEUMATIC DESPATCH.

ATOMIC THEORY, in chemistry. Two opposite opinions have long existed concerning the ultimate elements of matter. Some suppose that every particle of matter, however small, may be divided into smaller portions, provided our instruments and organs were adapted to the operation. Others contend that matter is composed of certain atoms, which are of such a nature as not to admit of further division. These opposite opinions have from time to time been keenly contested, and with variable success, according to the acuteness or ingenuity of their respective champions. But it was at last perceived that no positive data existed capable of deciding the question, and its interest therefore gradually declined. The progress of modern chemistry has revived the general attention to this controversy by affording a far stronger argument in favour of the atomic constitution of bodies than was ever advanced before, and which seems almost irresistible. We have only, in fact, to assume with Dr. Dalton that all bodies are composed of ultimate atoms, the weight of which is different in different kinds of matter, and we explain at once various laws of chemical union. According to this view every compound is formed by a combination of the atoms of its constituents. An atom of A may combine with 1, 2, 3, or more atoms of B—an arrangement on which depends the law of multiples. If water, for example, is composed of an atom of hydrogen and an atom of oxygen, it follows that every compound of hydrogen with an additional quantity of oxygen must contain 2, 3, or more atoms of oxygen; some multiple, in a word, by a whole number of the

quantity of oxygen contained in water. It is equally clear, from this view of the composition of water, that the weight of an atom of oxygen is eight times greater than an atom of hydrogen. The relative weight of the atoms of other substances may be determined in a similar manner. Thus an atom of carbon is six times, an atom of sulphur sixteen times, and an atom of chlorine thirty-five and a half times heavier than an atom of hydrogen; and this explains why they unite with one another in the proportions expressed by those numbers. What are called the *proportional numbers* are, in fact, nothing else but the relative weights of atoms. No one can suppose that the laws of chemical union are the effect of chance; there must be some cause for them in the nature of the ultimate particles of matter. This cause, as we have just seen, is completely supplied by the supposed atomic constitution of bodies, which accounts for the phenomena in the most beautiful and consistent manner. So perfect, indeed, is the explanation, that the existence of these laws might have been predicted by the aid of the atomic hypothesis long before they were actually discovered by analysis. But these are not the only arguments which we at present possess in favour of the existence of ultimate indivisible particles of matter. Dr. Wollaston, in his paper on the Finite Extent of the Atmosphere (Philosophical Transactions, 1822), has defended this side of the question on a new and independent principle; and the proof he has given of the atomic constitution of bodies appears decisive. Some chemists, even without expressly adopting the atomic theory itself, have followed Mr. Dalton in the use of the terms *atom* and *atomic weight*, in preference to *proportion*, *combining proportion*, *equivalent*, and others of a like kind. All these appellations, however, have the same signification; and in using the word *atom* instead of the others, it should be held in mind that it merely denotes the proportions in which bodies unite; that it is the expression of a fact which will remain the same whether the atomic hypothesis which suggested the employment of the term be true or false. There is one circumstance which, at first view, seems hostile to the supposed atomic constitution of matter. According to the law of multiples (see EQUIVALENTS, CHEMICAL), oxygen in the three oxides of lead is in the ratio of $1 : 1\frac{1}{2} : 2$; so that, if we regard the protoxide as composed of one combining proportion of lead to one proportion of oxygen, the second will contain one proportion and a half, or according to the atomic theory, one atom and a half of oxygen. Now, though the half of a combining proportion may be admitted, the existence of half an indivisible particle of matter is inconceivable; and this circumstance would be fatal to the atomic theory were there not some satisfactory mode of accounting for it. Several explanations might be brought forward. One of them, which has found its advocates, rests on the supposition that what is called the protoxide is, in reality, composed of one atom of lead to two atoms of oxygen; and that the real protoxide has not yet been discovered. Another mode of accounting for the anomaly is by regarding the present deutoxide as composed of the protoxide and peroxide combined with each other. A third method is by doubling both elements of the anomalous compound, by which the exact ratio is preserved, and the idea of the fraction of an atom is avoided. Thus the protoxide and peroxide of iron are composed, the first of one proportion, or 28 of metal + 8 of oxygen, and the second of 28 of metal + an atom and a half, or 12 of oxygen; or, what amounts to the same thing, of 56, or two atoms of iron, to 24, or three atoms of oxygen. These observations prove that the occurrence of half proportions is not inconsistent with the atomic constitution of bodies; they show that the difficulty is explicable, and probably will, in the progress of discovery, be entirely removed. In the meantime, however, it would be inconvenient to allow any speculative notions on the subject to interfere with actual practice; and therefore it is best at once to admit the occurrence of half proportions; and if any one prefer the term *atom* to *equivalent* or *proportion*, he must submit to the somewhat jarring expression of *half an atom*. Dr. Dalton supposed that the atoms of bodies are spherical, and has invented certain symbols to represent the mode in which he conceives they may combine together. (See his New System of Chemical Philosophy.) With regard to the nature of atoms, Lord Kelvin propounded the view that they consist of vortices or vortex rings in a homogeneous frictionless fluid. The latest view is that matter and electricity are identical, that atoms are complex aggregates of positive and negative electrons, the differences between the atoms depending mainly on the numbers and velocity of these electrons. Recent work on radium has supported this view.

ATOMS, according to the hypothesis of some philosophers, the primary parts of elementary matter not any further divisible. Moschus of Sidon, who is said to have lived before the Trojan war, taught, as we are told, that the original matter is composed of small indivisible bodies. Leucippus (510 B.C.) established a system respecting the origin of the world resting on the mixture of atoms, in which chance governed, in opposition to the immaterial system of the Eleatics, who contended that whatever existed was only one being, and that all apparent changes in the universe are mere illusions of sense. Democritus and Epicurus extended this system; the latter, particularly, made many additions to it. Lucretius, and among the moderns Gassendi, have illustrated the doctrine of Epicurus. Descartes formed from this his system of the vortices. Newton and Boerhaave supposed that the original matter consists of hard, ponderable, impenetrable, inactive, and immutable particles, from the variety in the composition of which the variety of bodies originates. A system founded on the theory of atoms is called *atomic*, for example, that of Le Sage; sometimes it is also called *corpuscular philosophy*, and is opposed to the *dynamic theory*. See DYNAMIC AND ATOMIC THEORIES.

ATREBATES, the ancient inhabitants of Gallia Belgica, who possessed that part of Gaul afterwards called *Artois*. A colony of them settled in Britain. Cæsar mentions them as one of the nations confederated against him, and as having engaged to furnish 15,000 troops to the allied army. The Atrebates, or Atrebatii, in Britain, resided next to the Bibroci, in a part of Berkshire and Oxfordshire. They were one of the tribes which submitted to Cæsar.

ATREUS, in fabulous history, son of Pelops and Hippodamia. He and his brother Thyestes murdered their half-brother Chrysippus, from jealousy of the affection entertained for him by their father. Thereupon they fled to Eurystheus, with whose daughter, Aërope, Atreus united himself, and after the death of his father-in-law became king of Mycene. Thyestes, yielding to an unlawful passion for the wife of his brother, dishonoured his bed, and had two sons by her. Atreus, after the discovery of this injury, banished Thyestes, with his sons. Thirsting for revenge, Thyestes conveyed away secretly a son of his brother, and instigated him to murder his own father. This design was discovered, and the youth, whom Atreus thought to be the son of his brother, was put to death. Too late did the unhappy father perceive his mistake. A horrible revenge was necessary to give him consolation. He pretended to be reconciled to Thyestes, and invited him with his two

sons to a feast, and after he had caused the latter to be secretly slain he placed a dish made of their flesh before Thyestes. When the father had finished eating Atreus brought the bones of his sons and showed him the dreadful revenge which he had taken. At this spectacle, the poets say, the sun turned back in his course, in order not to throw light upon such a horrible deed. Atreus (or his son Pleisthenes) was the father of Agamemnon and Menelaus, who are hence called the Atridæ, Atridēs (the singular) being often distinctively applied to Agamemnon.

ATRIDES. See preceding article.

ATRIP, a naval term applied to special positions of the anchor, sails, &c. The anchor is atrip when it is just drawn out of the ground and stands in a perpendicular direction.

ATRIPLEX, a genus of Chenopodiaceæ, differing from the type-genus in having monœcious flowers. They are mealy-leaved herbs known by the name of Orache, and their fruit is inclosed between the two persistent sepals of the female flower. *A. patula* and other species grow wild in Britain; and *A. hortensis* is sometimes cultivated as a substitute for spinach.

ATRIUM, the entrance hall and most important apartment in an ancient Roman house. It was usually ornamented with statues and various family relics, and in the roof there was an opening called the *compluvium*, towards which the roof sloped so as to throw the rain-water into a cistern in the floor known as the *impluvium*. In this room the nuptial couch was placed, and here the matron with the women of the household sat and span. It was also used as a reception room for visitors and clients. (See plate at article Pompeii.) In zoology the term is used to describe the chamber into which the intestine opens in Tunicata.

ATROPA, a genus of plants of the order Solanaceæ. The only British species is the Dwale, Belladonna, or Deadly Nightshade (*A. Belladonna*), a plant some three feet high, and extremely poisonous. See Nightshade, also Atropia.

ATROPHY is a deficient nourishment of the body. There are many diseases in which the body becomes daily more and more emaciated, appears deprived of its necessary nourishment, and, for that reason, of its common strength. It is only, therefore, in those cases in which the emaciation constantly increases that it constitutes a peculiar disease; for when it is merely a symptom of other diseases it ceases with the disease, as being simply a consequence of great evacuations, or of the diminished usefulness or imperfect digestion of the nourishment received. But, when atrophy constitutes a disease by itself, it depends upon causes peculiar to this state of the system. These causes are such as violent passions, organic disease, a want of proper food or of pure air, exhausting diseases, suppurations in important organs, as the lungs, the liver, &c. Copious evacuations of blood are also apt to produce this disease, and on this account lying-in women are often the subjects of this complaint. This state of the system is also sometimes produced by poisons, for example, arsenic, mercury, or lead, in painters, gilders, &c. A species of atrophy takes place in old people, in whom an entire loss of strength and flesh brings on a termination of life without the occurrence of any positive disorder. This is known as the *marasmus senilis*, or atrophy of old people. Atrophy is of frequent occurrence in infancy, as a consequence of improper or unwholesome food, exposure to cold, damp, or impure air, &c. This state of things is often fatal, although the efforts of the physician are sometimes successful, when all the causes of the disease have been previously removed. A local state of the same kind is sometimes produced in single limbs by palsies, or the pressure of tumours upon the nerves of the limb, &c., and is generally curable by removing the cause. *Cirrhosis* or drunkard's liver involves atrophy of the liver. In most cases of atrophy good food, exercise, and the use of tonics are the best remedies; electricity is occasionally serviceable in progressive muscular atrophy. In the case of the heart this disease is usually due to some diseased condition of the system, and the treatment to be adopted depends on the special character of the organic derangement.

ATROPIA, or Atropine, a crystalline alkaloid contained in the deadly nightshade. It is extremely poisonous, one of the effects it produces being dilatation of the pupil of the eye. Large doses cause delirium, convulsions, and finally stupor and death. It is employed for several purposes in medicine, to relieve pain or spasm, for instance, and to arrest excessive sweats. See Atropa.

ATROPOS, one of the Fates (which see).

ATTACCA, in music, signifies that a passage is to follow another immediately; for example, at the end of the third movement in Beethoven's C Minor (Fifth) Symphony.

ATTACHMENT, in law, a term for the taking or laying hold of a person or goods by virtue of a writ or precept. It is distinguished from an *arrest* by proceeding out of a higher court by precept or writ; whereas the latter proceeds out of an inferior court by precept only. An arrest lies only against the body of a man; whereas an attachment lies often against the goods only, and sometimes against the body and goods. In some countries a creditor may previously attach another person's property, real or personal, to satisfy the judgment he may recover: in other states no such previous attachment can ordinarily be made, and is permitted only in case of absconding debtors, or other particularly excepted cases. In respect to an arrest of the person, the laws of most countries do not permit any citizen to be seized and imprisoned without a decree or judgment of a court directly authorizing the arrest. In some of the states of the American Union a creditor to the amount of five dollars, or some other amount greater or smaller, may arrest his debtor at the commencement of the process against him, in order that the creditor may have his body to levy execution upon when the debt shall be established by a judicial decree or judgment. But attachment of the person for this cause is not permitted by the laws of most countries, except in cases of the apprehended absconding of the debtor; this being an exception to the rule most generally adopted, which is, that the creditor first establishes his debt, and gets judgment and execution upon it, before he can use it as an instrument for violating the personal liberty of his debtor. In cases of alleged crime the person of the accused party is seized, and he is imprisoned, or compelled to give bail, by the laws of all countries; but he is most generally first taken before a magistrate, and permitted to show cause against being imprisoned or required to give bail. A common cause of attachment is contempt of court, as against a defendant who does not appear after being summoned by subpœna; against an officer of a court for abusing the process of the court; against a witness who refuses to appear when summoned for the purpose of giving testimony, or who refuses to testify after he has appeared; against any person, whether an officer of the court, a party, witness, or mere by-stander, for disorderly conduct in the presence of the court, whereby its proceedings are disturbed and the administration of justice interrupted; and, in general, an attachment lies against any person who directly obstructs or interferes with the

regular administration of justice. It lies against the judges of an inferior court who proceed in a case contrary to the order of a superior court.

ATTACHMENT, FOREIGN, is the attachment, by a creditor, of a debt due to his debtor from a third person; called *foreign* attachment from its being one mode of securing debts due from foreigners. In Scotland it is called *arresting* the debt. In London the process is called a *garnishment*, or *warning*, the person summoned being the *garnishee*. The same process is in some of the United States called the *trustee process*, and the person summoned is called the *trustee*, on the supposition of his having in his hands and possession, or being *intrusted* with, the money or goods of the principal debtor.—The general rule as to arresting debts due from third persons, by foreign attachment is, that only absolute *debts* can be so attached, not the claims which the principal debtor may have against the garnishee, or supposed trustee, for damages on account of trespasses and wrongs done to him by the garnishee or supposed trustee. As the process is instituted to recover a supposed debt due to the plaintiff from the principal defendant, by obtaining satisfaction of a debtor of that defendant, he must have notice, and be made a party to the suit, and have an opportunity to dispute the demand of the plaintiff; and the law, in some instances at least, allows the garnishee or trustee, if he be really a debtor to the principal defendant, to take upon himself the defence against the plaintiff's demand.

ATTACK. Every combat consists of attack and defence; the first, with few exceptions, will always be more advantageous: hence an experienced general chooses it, if possible, even in a defensive war. Nothing is more ruinous than to lose its advantage; and it is one of the most important objects to deprive an adversary of it, and to confine him to the defensive. The attack is directed according to the condition and position of the enemy, according to the purpose of the war, according to place, time, and circumstances. Many modes and combinations are allowable. The simplest and most unexpected form will be the best. On the dexterity and courage of the troops, the correct and quick execution of the attack will depend. Those attacks are the best where all the forces can be directed in concert towards that point of the enemy on which his position depends. If he be beaten at this point, the resistance at others will be without concert or energy. Sometimes it may be of advantage to attack the weakest side of the enemy, if in this way a fatal blow can be given to him; otherwise, an attack at this point is not advisable, because it leads to no decisive results, leaves the stronger points to be overcome afterwards, and divides the force of the assailant. In most cases the enemy may be defeated, if his forces can be divided, and the several parts attacked in detail. The worst form of attack is that which extends the assailing troops in long, weak lines, or scatters them in diverging directions. It is always unfortunate to adopt half measures, and not aim to attain the object at any price. Instead of saving power, these consume it in fruitless efforts, and sacrifices are made in vain. Feeble assaults and protracted sieges are of this ruinous character. The forms of attack in a battle, which have been used from the earliest times, are divided by the tacticians into: 1. The parallel. This is the most natural form, and even the troops attacked strive as much as possible to preserve it; for as long as they can do so they retain their connection, and the power of applying their force as occasion may require; but, for this very reason, it is not the best form of attack, because it leaves the defensive party too long in possession of his advantages. 2. The form in which both the wings attack, and the centre is kept back. Where the front of the enemy is weak (the only case in which it is practicable) it appears indeed overpowering. 3. The form in which the centre is pushed forward, and the wings kept back, will hardly ever be chosen, on account of several evident disadvantages. 4. The famous oblique mode, where one wing advances to engage, whilst the other is kept back, and occupies the attention of the enemy by pretending an attack. Epaminondas, if not the inventor of this form, knew at least how to employ it to the greatest advantage. Whilst the wing which remained behind engaged the attention of the enemy, he increased continually the strength of the one advancing, which he led against the flank of the enemy, with a view of overpowering it by numerical superiority. The success of this mode is almost certain, provided the enemy takes no measures against it. In our times this form of attack is executed in another way:—whilst engaging the enemy, his flank is surrounded by detached corps, which fall, at the same time, on his rear. If he suffers this quietly he is vanquished. The enemy's attention is kept occupied, during such operations, mostly by feigned attacks or movements, which are called, in general, *demonstrations*, and are intended to keep him in error concerning the real object. (On the attack of fortresses, see the article SIEGE.) Field fortifications are attacked with columns, if possible, from several sides at the same time, and with impetuosity. Commonly, the artillery breaks a way beforehand, destroys the works, and disturbs the garrison.

ATTAINDER. See BILL OF ATTAINDER.

ATTAINT, is a writ at common law against a jury for a false verdict It might be brought by a party aggrieved, and lay where the jury found a verdict against the evidence, or found a fact foreign to the evidence, or where their verdict was against well-known and acknowledged law. It was a process for trying the jurymen for misconduct in trying a cause. The writ seems to be now obsolete in England.

ATTERBURY, FRANCIS, a celebrated English prelate, was born in 1662, and received his education at Westminster, where he was elected a student of Christ Church College, Oxford. He distinguished himself at the university as a classical scholar, and gave proofs of an elegant taste for poetry. In 1687 he took his degree of M.A., and for the first time appeared as a controversialist in a defence of the character of Luther, entitled, Considerations on the Spirit of Martin Luther, &c. He was also thought to have assisted his pupil, the Hon. Mr. Boyle, in his famous controversy with Bentley on the Epistles of Phalaris. He continued some time longer at college, exceedingly discontented, feeling, with truth, that he was adapted to act on a wider theatre, and possessing all the ambition and restlessness by which his subsequent career was so much distinguished. His father advised him to marry into some family of interest, 'bishop's, or archbishop's, or some courtier's;' to which paternal counsel the future bishop duly attended. Having taken orders in 1691 he settled in London, where he became chaplain to William and Mary, preacher of Bridewell, and lecturer of St. Bride's, and soon became distinguished by the spirit and elegance of his pulpit compositions, but not without incurring opposition, on the score of their tendency and doctrine, from Hoadly and others. Controversy, however, was altogether congenial to the disposition of Atterbury, who, in 1706, commenced one with Dr. Wakes, which lasted four years, on the rights, privileges, and powers of convocations. For this service he received the thanks of the lower house of convocation, and the degree of Doctor of Divinity

from Oxford. Soon after the accession of Queen Anne he was made dean of Carlisle, and besides his dispute with Hoadly on the subject of passive obedience, he aided in the defence of the famous Sacheverell, and wrote A Representation of the Present State of Religion, which was deemed too violent to be presented to the queen, although privately circulated. In 1712 he was made dean of Christ Church, and in 1713 Bishop of Rochester and dean of Westminster. The death of the queen, in 1714, put an end to his hopes of further advancement; for the new king treated him with great coolness, doubtless aware of either the report or the fact of his offer, on the death of Anne, to proclaim the Pretender in full canonicals, if allowed a sufficient guard. Atterbury not only refused to sign the loyal declaration of the bishops in the rebellion of 1715, but suspended a clergyman for lending his church for the performance of divine service to the Dutch troops brought over to act against the rebels. Not content with a constitutional opposition, he entered into a correspondence with the Pretender's party, was apprehended in August, 1722, and committed to the Tower; and in the March following a bill was brought into the House of Commons for the infliction of pains and penalties. This measure met with considerable opposition in the House of Lords, and was resisted with great firmness and eloquence by the bishop, who maintained his innocence with his usual acuteness and dexterity. His guilt, however, has been tolerably well proved by documents since published. He was deprived of his dignities, and outlawed, and went to Paris, where he chiefly occupied himself in study, and in correspondence with men of letters. But even here, in 1725, he was actively engaged in fomenting discontent in the Highlands of Scotland. He died in 1731, and his body was privately interred in Westminster Abbey. As a composer of sermons he still retains a great portion of his original reputation. His letters, also, are extremely easy and elegant; but, as a critic and a controversialist, he is deemed rather dexterous and popular, than accurate and profound. If an anecdote told by Pope to Chesterfield be correct, he was a sceptic early in life; but the same authority also states that he ceased to be so after his mind had become mature.

ATTICA, a state of ancient Greece, the capital of which, Athens, was once, by reason of its intellectual culture and refinement, the first city in the world, is a peninsula, united, towards the N., with Bœotia, towards the W., in some degree, with Megaris, and extends far into the Ægean Sea at Cape Sunium (now *Cape Colonna*), where the Athenians had a fortress and a splendid temple of Minerva. The unfruitfulness of its soil protected it against foreign invaders, and the Athenians boasted of their ancient and unmingled race. They called themselves sons of the soil on which they dwelt, and pretended that they originated at the same time with the sun. The earliest inhabitants of Attica lived in a savage manner, without bread, without marriage, and in scattered huts, until the time of Cecrops, who came, B.C. 1550, with a colony from Sais, at the mouth of the Nile, to Attica, and is acknowledged as their first real king. He softened their manners, and taught them a better mode of living; he planted the olive-tree, and instructed them in the culture of different kinds of grain; he instituted the worship of the gods, and commanded to offer them sacrifices of the fruits of the earth; he established laws of marriage, and directed the burial of the dead. The inhabitants, who amounted to about 20,000, he divided into four classes, compelled them to bring their habitations near to each other, and protect them with a wall against the attacks of robbers. This, according to the story current in antiquity, was the origin of Athens, which at that time bore the name of *Cecropia;* but the history of Attica at this early period, and for a considerable time afterwards, cannot be considered authentic. One of Cecrops' descendants founded eleven other cities, which in after-times made war upon each other. Theseus compelled these cities to unite, and to give to Cecropia, now called *Athens*, as the capital city of the whole country, the supreme power over the confederacy. He founded the great feast called the *panathenæa*. He himself, as the head of the state, watched over the administration of the laws, and commanded the army. He divided the whole people into three classes—noblemen, husbandmen, and mechanics. From the first class the magistrates were selected, who performed the duties of priests, and interpreted the laws. He embellished and enlarged Athens, and invited foreigners to people the country. After the death of Codrus, B.C. 1068, the monarchical form of government, which had continued 487 years from the time of Cecrops, was abolished. An archon, chosen for life, possessed the regal power. After 316 years the term of office of the archons was limited to ten years, and seventy years later to one year, and their number was increased to nine. A regular code of laws was now needed. The archon Draco was commissioned to draw one up; but his severity disgusted the minds of the people, and, B.C. 594, Solon introduced a milder code and a better constitution. He provided that the form of government should continue democratic, and that a senate of 400 members, chosen from the people, should administer the government. He divided the people into four classes, according to their wealth. The offices of government were to be filled from the three first, but the fourth were to be admitted to the assemblies of the people, and to have an equal share, by their vote, in legislation. But this constitution was too artificial to be permanent. Pisistratus, a man of talents, boldness, and ambition, put himself at the head of the poorer classes, and made himself master of the supreme power in Athens. His government was splendid and beneficent, but his two sons could not maintain it. Hipparchus was murdered, and Hippias banished. Clisthenes, a friend of the people, exerted himself to prevent future abuses by some changes in the laws of Solon. He divided the people into ten classes, and made the senate consist of 500 persons. Attica was already highly cultivated; the vintage and harvest, like all the labours of this gay people, were celebrated with dance and song, with feasts and sacrifices. The wool of Attica was famous on account of the care bestowed upon the sheep, and the skill with which it was dyed of the most beautiful colours. Mount Hymettus (which see) yielded the finest honey, and Mount Laurium contained rich silver mines, the products of which were appropriated to the support of the fleet. Then came the splendid era of the Persian war, which elevated Athens to the summit of fame. Miltiades at Marathon, and Themistocles at Salamis, conquered the Persians by land and by sea. The freedom of Greece escaped the dangers which had threatened it; the rights of the people were enlarged; the archons and other magistrates were chosen from all classes without distinction. The period from the Persian war to the time of Alexander (B.C. 500 to 336) was most remarkable for the development of the Athenian constitution. According to Böckh's excellent work, The Public Economy of Athens, Attica contained, together with the islands of Salamis and Helena, a territory of 847 square miles, with 500,000 inhabitants, 365,000 of whom were slaves. Böckh estimates the inhabitants of the city and harbours at

180,000; those of the mines at 20,000. Cimon and Pericles (B.C. 444) introduced the highest elegance into Athens, but the latter laid the foundation for the future corruption of manners, and for the gradual overthrow of the state. Under him began the Peloponnesian war, which ended with the conquest of Athens by the Lacedæmonians. The vanquished were obliged to receive the most mortifying conditions from the victors. Thirty supreme magistrates were placed over the city, who, under the protection of the Lacedæmonian garrison, were arbitrary and cruel. After eight dreadful months Thrasybulus overthrew this tyranny, and restored freedom and the old constitution, with some improvements. Athens began to elevate herself again among the states of Greece, and was fortunate in her alliance with Thebes against Sparta. But this new period of power did not long continue. A more dangerous enemy rose in the north—Philip of Macedon. The Athenians had opposed him in the Phocian war, and Philip, therefore, took possession of some of their colonies. The Greeks took up arms, but the battle of Cheronæa (B.C. 338) was the grave of their liberty. Athens, together with the other states of Greece, was now dependent on the Macedonians. In vain, after the death of Alexander, did the Athenians attempt to regain their freedom: they were obliged to receive a Macedonian garrison in the harbour of Munychia. Antipater ordered that only those citizens who possessed an estate of more than 2000 drachmæ should take part in the administration of the government. Soon after, Athens was taken by Cassander, because it had joined his enemies, contrary to the advice of Phocion. Cassander restored the oligarchy, and named Demetrius Phalereus governor of the state, who quietly enjoyed the office for ten years. But the Athenians, who hated him because he was not chosen by them, called Demetrius Poliorcetes to their assistance, who took the city, restored the ancient constitution, and was loaded with the most extravagant marks of honour by the Athenians; yet, when he went to war, he lost the affection of the unstable multitude, who, on his return, excluded him from the city. But he conquered Athens, forgave the citizens, and permitted them to enjoy their liberty, merely placing a garrison in the havens of Munychia and the Piræus. This garrison was afterwards driven out by the Athenians, who, for a long time, maintained their freedom. Antigonus Gonatas again conquered them, and in this situation they remained until they separated themselves from the Macedonians, and joined the Achæan league. They afterwards united with the Romans against Philip, and their new allies confirmed their freedom. When they suffered themselves to be misled to support Mithridates against the Romans, they drew upon themselves the vengeance of Rome. Sulla captured the city, and left it only an appearance of liberty, which it retained until the time of Vespasian. This emperor formally changed it into a Roman province. After the division of the Roman Empire, Attica belonged to the empire of the East. A.D. 396, it was conquered by Alaric the Goth, and the country devastated. The nomarchy of Attica in the modern kingdom of Greece has a population (1907) of 341,247. Till 1899 it formed one nomarchy with Bœotia. We possess most beautiful engravings of the antiquities of this country in The Unedited Antiquities of Attica, comprising the Architectural Remains of Eleusis, Rhamnus, Sunium, and Thoricus, by the Society of Dilettanti (London, 1817, folio). See ATHENS.

ATTIC BASE, a peculiar kind of base, used by the ancient architects in the Ionic order, and by Palladio and some others in the Doric. *Attic Order*, or *Attics*, in architecture; a kind of order raised upon another larger order by way of crowning, or to finish the building.—*Attic Story*, in architecture; a story in the upper part of a house, rising above the main portion of the building.

ATTICUS, HERODES. See HERODES ATTICUS.

ATTICUS, TITUS POMPONIUS, one of the most noble of the ancient Romans, and the intimate friend of Cicero, born 109 B.C., and died 32 B.C. The Pomponian family, from which he originated, was one of the most distinguished of the *equites*, and derived its origin from Numa Pompilius. He lived in the latter period of the Republic, and acquired great celebrity from the splendour of his private character. He inherited from his father and from his uncle, Q. Cæcilius, great wealth. When he attained maturity, the Republic was disturbed by the factions of Cinna and Sulla. His brother Sulpicius, the tribune of the people, being killed, he thought himself not safe in Rome, for which reason he removed, with his fortune, to Athens, where he devoted himself to science. His benefits to the city were so great, that he gained the affections of the people in the highest degree. He acquired so thorough a knowledge of Greek, that he could not be distinguished from a native Athenian. When Rome had recovered some degree of quiet, he returned, and inherited from his uncle 10,000,000 of sesterces. His sister married the brother of Cicero. With this orator, as well as with Hortensius, he lived on terms of intimate friendship. It was his principle never to mix in politics, and he lived undisturbed amid all the successive factions which reigned in Rome. Cæsar treated him with the greatest regard, though he was known as a friend of Pompey. After the death of Cæsar, he lived in friendship with Brutus, without, however, offending Antony. When Brutus was obliged to flee from Italy, he sent him 1,000,000 of sesterces, and likewise supported Fulvia, the wife of Antony, after the disastrous battles of Mutina, and therefore was spared when fortune again smiled on Antony, and the friends of Brutus generally were the victims of his vengeance. The daughter of Atticus was married to M. Vipsanius Agrippa, and Augustus became his friend. He often received letters both from Augustus and from Antony, when he was absent from Rome. He reached the age of seventy-seven years without sickness. At this time he became afflicted with a disorder which he felt to be incurable. He therefore ended his life by voluntary starvation, and was buried near the Appian Way, in the grave of his uncle.

ATTILA (in German, *Etzel*), the son of Mundzuk, a Hun of royal descent, who followed his uncle Roas in 434, and shared the supreme authority with his brother Bleda. These two leaders of the barbarians, who had settled in Scythia and Hungary, threatened the Eastern Empire, and twice compelled the weak Theodosius II. to purchase an inglorious peace. Their power was feared by all the nations of Europe and Asia. The Huns themselves esteemed Attila their bravest warrior and most skilful general. Their regard for his person soon amounted to superstitious reverence. He gave out that he had found the sword of their tutelar god, and, proud of this weapon, which added dignity to his power, he designed to extend his rule over the whole earth. He caused his brother Bleda to be murdered (444), and when he announced that it was done by the command of God, this murder was celebrated like a victory. Being now sole master of a warlike people, his unbounded ambition made him the terror of all nations, and he became, as he called himself, the *scourge* which God had chosen to chastise the human race. In a short time he extended his dominion over all the people of Germany and Scythia, and the eastern

and western emperors paid him tribute. The Vandals, the Ostrogoths, the Gepidæ, and a part of the Franks united under his banners. Some historians assure us that his army amounted to 700,000 men. —When he had heard a rumour of the riches and power of Persia, he directed his march thither. He was defeated on the plains of Armenia, and drew back to satisfy his desire of plunder in the dominions of the Emperor of the East. He easily found a pretext for war, for all states which promised him a rich booty were his natural enemies, and all princes whom he hoped to conquer had broken alliances. He therefore went over to Illyria, and laid waste all the countries from the Black to the Adriatic Sea. The Emperor Theodosius collected an army to oppose his progress; but in three bloody battles fortune declared herself for the barbarians. Constantinople was indebted to the strength of its walls, and to the ignorance of the enemy in the art of besieging, for its preservation. Thrace, Macedonia, and Greece, all submitted to the savage robber, who destroyed seventy flourishing cities. Theodosius was at the mercy of the victor, and was obliged to purchase a peace. One of the servants of Attila, Edekon, was tempted by a eunuch, Chrysaphius, to undertake the assassination of his master on his return to the Danube; but, at the moment of execution, his courage failed him; he fell at the feet of his master and acknowledged his criminal design. Constantinople trembled at the idea of Attila's revenge; but he was contented with reproaching Theodosius for his perfidy, and requiring the head of Chrysaphius. The emperor engaged to pay a new tribute.—Attila now directed his views to Gaul. With an immense army he passed the Rhine, the Moselle, and the Seine, came to the Loire, and sat down under the walls of Orleans. The inhabitants of this city, encouraged by their bishop, Agnan (Anianus), repelled the first attack of the barbarians, and the united forces of the Romans, under their general, Aetius, and of the Visigoths, under their king, Theodoric, compelled Attila to raise the siege. He retreated to Champagne, and waited for the enemy in the plains of Chalons. The two armies soon approached each other. Attila, anxious for the event of the battle, consulted the soothsayers, and they assured him of a defeat. He concealed his alarm, rode through the ranks of his warriors, reminded them of their deeds, spoke of his joy at the prospect of a battle, and at the thought that their valour was to be rewarded. Inflamed by this speech, and by the presence of their leader, the Huns were impatient for battle. Both armies fought bravely. At length the ranks of the Romans and Goths were broken through, and Attila was already sure of the victory, when the Gothic prince Thorismond, the son of Theodoric, poured down from the neighbouring height upon the Huns. He threw them into disorder, spread death through their ranks, and Attila, pressed on all sides, escaped with difficulty to his camp. This was perhaps the bloodiest battle which has ever been fought in Europe; for, according to contemporary historians, 106,000 dead bodies covered the field of battle. Attila caused all his camp equipage and treasures to be brought together into a heap, in order to burn himself with them, in case he should be reduced to extremities. But the enemy were contented with collecting their forces during the night, and having paid the last honours to the dead body of King Theodoric (Dietrich), which they discovered with difficulty, they saluted his son, Thorismond, king upon the field of battle. Thus Attila escaped destruction. But the Franks pursued him, hanging on his rear, till he had passed the Rhine. Rather irritated than discouraged, he sought a new opportunity to seize upon Italy, and demanded Honoria, the sister of Valentinian III., in marriage. This princess had been separated from the court, and confined in a monastery, on account of an intrigue with Eugenius, her chamberlain. She offered her hand to Attila; he accepted the proffered match, and demanded as a dowry half the kingdom. When this demand was refused he attacked Italy with dreadful fury. The emperor trembled, and his ambassadors supplicated in vain. Attila conquered and destroyed Aquileia, Padua, Vicenza, Verona, Bergamo, and laid waste the plains of Lombardy. The inhabitants fled to the Alps, to the Apennines, and to the small islands in the shallows (lagoons) of the Adriatic Sea, where they built Venice. The emperor had no army to oppose him; the Roman people and senate had recourse to tears and supplications. Pope Leo I. went with the Roman ambassadors to the enemy's camp and succeeded in obtaining a peace. Attila went back to Hungary. The Romans looked upon their preservation as a miracle, and the old chronicles relate that the threats of St. Peter and St. Paul had terrified Attila—a legend which the art of Raphael and Alghardi has immortalized. Not having obtained Honoria for a wife, Attila would a second time have demanded her, sword in hand, if the beautiful Ildico had not been added to his numerous wives, with whom he solemnly united himself (453). This circumstance hindered him from fulfilling his threats. On this occasion he gave himself up to all the extravagance of debauchery; but on the day after the marriage the servants and warriors, impatient to salute their master, thronged into the tent: they found Ildico veiled, sitting by the cold corpse of her husband. During the night he had either burst a blood-vessel or been murdered by his bride to revenge her people (453). The news of his death spread sorrow and terror in the army. His body was inclosed in three coffins—the first was of gold, the second of silver, and the third of iron. The captives who had made the grave were strangled. The description that Jornandes has left us of this barbarian king reminds us of his Kalmuck-Tartar origin. He had a large head, a flat nose, broad shoulders, and a short and ill-formed body. His walk was proud, his voice strong and well-toned.

ATTITUDE, as a term of art, signifies an artistic pose or position assumed by living figures. Attitudes require a regular study, a part of which is a knowledge of anatomy. The art of exhibiting attitudes, at least in modern times, is of recent invention. At the end of the 18th century the celebrated Lady Hamilton began the practice, and as every art begins with imitation, she imitated, with great talent, the attitudes of antique statues in many large towns of Europe, and Sir William Hamilton could say that he possessed, in his wife, a whole collection of antiques. Her dress was a simple tunic, fastened with a ribbon tight under the breast, and a shawl. With these she imitated all the different draperies. Mr. Rehberg drew her attitudes, and published them in London. On the continent of Europe this art was carried to much perfection by Mrs. Hendel Schutz, who exhibited the most beautiful attitudes, copied from the Greek, Egyptian, Italian, and German styles of art. But she was not satisfied with imitations: she invented many attitudes, which were declared by all the critics of the day (among whom was Goethe) some of the finest productions of art. Her attitudes were drawn and published by Peroux and Ritter (Frankfort on the Main, 1809).

ATTORNEY (*attornatus*, in Latin), a person appointed to do something for and in the stead and name of another. A *public attorney* or *attorney at law* is a person qualified to appear for another before a court of law to prosecute or defend any action on

behalf of his client. The term was formerly applied especially to those practising before the supreme courts of common law at Westminster, and corresponded to the term *solicitor* used in regard to the Courts of Chancery. As an attorney was almost invariably a solicitor, the two terms came to be generally regarded as synonymous. By the Judicature Act of 1873 all persons practising before the supreme courts at Westminster are now called solicitors. Attorneys or solicitors do not plead or argue in court on behalf of their clients, this being the part of the barristers or council; their special functions may be defined to be, to institute actions on behalf of their clients and take the necessary steps for defending them, to furnish counsel with the necessary materials to enable them to get up their pleadings, to practise conveyancing, to prepare legal deeds and instruments of all kinds, and generally to advise with and act for their clients in all matters connected with law. An attorney, whether private or public, may have *general* powers to act for another; or his power may be *special*, and limited to a particular act or acts. In Scotland there is no class of practitioners of the law who take the name of *attorneys*. A special attorney is appointed by a deed called a *power* or *letter of attorney*, and the deed by which he is appointed specifies the acts which he is authorized to do. It is a commission, to the extent of which only he can bind his principal. As far as the acts of the attorney, in the name of the principal, are authorized by his power, his acts are those of his principal. But if he goes beyond his authority, his acts will bind himself only; and he must indemnify any one to whom, without authority, he represents himself as an attorney of another, and who contracts with or trusts him, as being such attorney.

ATTORNEY-GENERAL. See SUPP.

ATTRACTION, the tendency, as well of the parts of matter in general, as of various particular bodies, to approach each other, to unite, and to remain united; sometimes, also, the power inherent in matter, exerting itself at the moment of approach. Experience teaches that this property is common to all matter. Even liquids cohere in their parts, and oppose any endeavour to separate them. The minute particles unite into drops; drops, if they are brought in contact, into large masses. Fluids attach themselves to solid bodies, particularly to such as have very smooth surfaces, as to glass; they rise up of themselves in fine tubes (see CAPILLARY TUBES), &c. Every body tends to the earth, and if raised from its surface falls back to it again. The plumb-line, which is usually vertical, takes an oblique direction in the vicinity of high mountains (see DENSITY); the moon is constantly drawn towards the earth; the earth and the other planets towards the sun. The heavenly bodies are subject to a simple law of mutual attraction. The Greek writers on natural philosophy, speak of attraction; Copernicus and Tycho Brahe likewise admit it; Kepler's bold and comprehensive mind first hazarded the assertion that it must be universal and mutual in all bodies; Descartes sought to banish it entirely from natural philosophy, as one of those occult powers which he did not acknowledge; but Newton adopted the theory of a universal attractive force, and determined its laws after many years of accurate observation, though he was opposed by Leibnitz and others. When bodies tend to come together from sensible distances, that tendency is denominated either the attraction of *gravitation*, *magnetism*, or *electricity*, according to circumstances; when the surfaces of bodies in contact tend together, it is by *adhesion;* when the particles of the same body tend together, it is by *cohesion;* and when the particles of different bodies in contact tend together, it is by *affinity*. These three latter species of attraction act at insensible distances. We cannot enumerate all the particular subdivisions of attraction, but the most important are those of affinities in chemistry (which see), of magnetic and electric attractions, &c. (Respecting these, see the particular articles.) The best works on the attraction of the heavenly bodies are Newton's Principia, and Laplace's Mécanique Céleste. See COHESION, GRAVITATION, &c.

ATTWOOD, GEORGE, F.R.S., an eminent mathematician, who was educated at the University of Cambridge. In 1784 he published, in one volume, 8vo, a Treatise on the Rectilinear Motion and Rotation of Bodies; with a Description of Original Experiments relative to that Subject—a work remarkable for its perspicuity and the extensive information which it affords. About the same time he made public an Analysis of a Course of Lectures on the Principles of Natural Philosophy, read at the University of Cambridge, which is not less valuable than the preceding. William Pitt, having attended Mr. Attwood's university lectures, conceived such an opinion of his talents and scientific information, that he engaged him to devote a considerable part of his time to financial calculations, and bestowed on him a sinecure office, the income of which he retained from 1784 till his death in 1807, at the age of sixty-two, when the office which he had held was abolished. Mr. Attwood published a Dissertation on the Construction and Properties of Arches (1801, 4to), and several other valuable treatises relating to mathematics and mechanical science. Mr. Attwood invented a machine which is still used in physical lecture-rooms, and which affords great facilities for verifying the laws of falling bodies.

ATYS, or ATTYS.—1. The favourite of Cybele, who, having broken the vow of chastity which he made to the goddess, castrated himself, as a punishment for his crime. (See CYBELE.)—2. A son of Crœsus, king of Lydia—an affecting example of filial love. He was dumb, when, seeing a soldier in a battle who had raised a sword against his father, he exerted himself so much that the bands of his tongue gave way, and he cried out, 'Soldier, kill not Crœsus!' —at least such is the story.

AUBAINE, DROIT D' (from *alibi nati*, elsewhere born), a law which formerly prevailed in France with regard to aliens and their property. They were permitted to acquire all kinds of property, even real estate. They could not, however, obtain it by inheritance, or bequeath it at their death. The king (by virtue of the *droit d'Aubaine*), in whose peace and protection they remained during life, was their only heir after death. No feudal lord could acquire this right. It was very early softened in favour of the relations who resided in the kingdom. Some cities, as Lyons, in order to favour commerce, obtained the privilege that the estate of foreigners who died in them should go to the foreign heirs, and this was agreed upon by treaties with certain states. It was abolished by the Constituent Assembly in 1791, restored by the Code Napoléon, and was fully abolished in 1819. See ALIEN.

AUBE, a French department, formed out of the S. of Champagne and a small portion of Burgundy, and bounded N. by Marne, E. Haute-Marne, S.E. Côte-d'Or, S. and S.W. Yonne, and W. Seine-et-Marne; greatest length, E. to W., 72 miles: breadth, 57 miles; area, 2351 square miles; pop. in 1901. 246,163. The surface is undulating, seldom hilly, and is watered by the Aube, Armance, Mogne, and Vannes. The N. and N.W. districts are very bleak, bare of trees, and almost destitute of vegetation; the southern districts, on the contrary, remarkably fertile, the soil consisting generally of deep alluvial deposits, well adapted for the ordinary grain and pulse crops, and

also for hemp. The forests, which are extensive, furnish much fuel for the supply of Paris. A large extent of ground is in vineyards. The chief manufactures are worsted and hosiery. Troyes is the capital.

AUBE (ancient *Alba*), a river which gives name to the above department, rises in a range of hills in Haute-Marne, flows N.W., and after a course of 113 miles joins the Seine a little above Marcilly. It is navigable to Arcis, a distance of about 20 miles.

AUBER, DANIEL FRANÇOIS ESPRIT, a celebrated and extremely productive French operatic composer; born Jan. 29, 1782, at Caen, in Normandy; died at Paris, May 13, 1871. He was originally intended for a mercantile career, and was for a time a clerk in London; but from natural inclination devoted himself to the study of music, in which he had the assistance of Cherubini. His first decided success was his opera La Neige, which was produced in 1824, and at once made his name known even in foreign countries. By this time he had associated himself with Scribe, a very skilful writer of *libretti*; and other operas too numerous to mention now followed in quick succession, for which the words were supplied by Scribe, and the music by Auber. Some of these are still favourites, for example, Le Domino Noir, Les Diamants de la Couronne (Crown Diamonds), and above all Fra Diavolo, and La Muette de Portici (usually known as Masaniello), in which last work he distinguished himself as a composer of serious opera, and attained a height which not one of his other works ever approached. His peculiar field, however, was the comic opera, in which by his charming melodies, bearing strongly the stamp of the French national character, as well as by his other excellences, he acquired general popularity.

AUBIGNÉ, MERLE D'. See MERLE D'AUBIGNÉ.

AUBIGNÉ, THEODORE AGRIPPA D', a French author, born on Feb. 8th, 1552, at Saint Maury (Saintonge). He early gave proofs of talent and received a good education. He fought under Henry IV., king of France, who made him a gentleman of his bed-chamber; but when the king, thinking it necessary, favoured the Catholics more than the Protestants, Aubigné expressed his displeasure with little reserve, and lost the favour of Henry. He now retired to Geneva, where he devoted himself to literary pursuits. He wrote a Histoire Universelle, from 1550 to 1601, three vols. folio, the first volume of which was ordered to be burned by the parliament of Paris. A volume of sonnets and other poems, under the title Le Printemps, also bears his name. He died at Geneva on April 29th, 1630.

AUBREY, JOHN, F.R.S., an English antiquary, born at Easton Pierse in Wiltshire, in 1626, and educated at Trinity College, Oxford. He inherited estates, but lost his property by lawsuits and carelessness, and was reduced to absolute want; but was supported by friends till his death at Oxford in 1697. He published little, but left large collections of manuscripts, which have been used by subsequent writers. He collected materials for the Monasticon Anglicanum, and afforded important assistance to Wood, the Oxford antiquary. His Miscellanies (London, 1696) contain a great deal of curious and interesting information, but also display much credulity and superstition. Another work of his was published in 1719 under the title of the Natural History and Antiquities of the County of Surrey. In 1898 appeared a work by him entitled Brief Lives Chiefly of Contemporaries, edited by Andrew Clark (2 vols.).

AUBURN, a handsome city of New York state, capital of the county of Cayuga, at the N. end of Owasco Lake, 170 miles W. of Albany. It is a pleasant and flourishing place, and contains a court-house, a state prison large enough to receive more than 1000 prisoners, a Presbyterian theological seminary, a state lunatic asylum, &c. The theological seminary was incorporated in 1820. In the town or vicinity are manufactures of cotton, wool, iron, reaping and mowing machines, paper, &c. It is also an important railroad centre. Pop. in 1910, 34,668. Several other towns in the United States also bear this name.

AUBUSSON, PIERRE D', grand-master of the knights of St. John of Jerusalem, born in 1423 of a family descended from the old counts of La Manche in France, served it is said in early life in the wars against the Turks (though of this there is but little evidence), and on his return, having been presented at the French court, became a favourite of the dauphin, afterwards Louis XI. Some time after he entered the order of St. John, first obtained a commandery, next was made grand-prior, and in 1476, on the death of Grand-master Orsini, succeeded him. In 1480 the island of Rhodes, the head-quarters of the order, was invaded by a Turkish army of 100,000 men. The town was besieged for eighty-nine days and then assaulted, but the valour of D'Aubusson and his knights proved victorious, and the Turks were obliged to retire, leaving 9000 dead and carrying off 15,000 wounded. D'Aubusson's whole soul was in the war against the Turks, but when he saw Christian princes, instead of uniting to carry it on with vigour, wasting their resources in war with each other, he was seized with deep melancholy, and died at Rhodes in 1503.

AUCH a town of southern France, capital of the department of Gers, 42 miles W. of Toulouse. It is one of the most ancient towns in France, and appears, from the numerous antiquities which have been found in or near it, to have possessed great importance under the Romans. It rises from the Gers in the form of an amphitheatre, and though on the whole very indifferently built, possesses one of the finest Gothic cathedrals of which France can boast, with excellent examples of stained glass and wood-work. Pop. in 1906. 11,961.

AUCKLAND, a town of New Zealand, in the North Island, in the provincial district of the same name. It stands on the southern shore of Waitemata Harbour, one of the finest harbours of New Zealand, an inlet of Thames Gulf. At this point the island is only six miles across, and there is another harbour on the opposite side of the isthmus. There are several jetties and wharves, giving facilities for the loading and discharge of vessels up to 4000 tons burden, besides two graving docks, one of which, the Calliope Dock, opened in 1887, is one of the largest in the southern seas. The principal public buildings are the government offices, the Government House, the Supreme Court, the custom-house, post and telegraph offices, the Exchange; numerous churches and chapels, high-class and common schools; the Auckland Institute, with fine library and museum; a general hospital and asylums for the blind, deaf-mutes, orphans, and the destitute generally; several public halls; a theatre, Choral Hall, and Opera House. The chief manufacturing establishments are ship-building yards, boiler works, sash and door factory, glass-works, shoe-factories, &c. There is connection with the chief places on the island by rail, and regular communication with the other ports of the colony, Australia, and Fiji, by steam. Pop. of the city and suburbs (1901), 67,226. The provincial district of Auckland forms the northern part of North Island, with an area of 25,746 square miles; pop. (1901), 175,854.

AUCKLAND, William Eden, Lord, a statesman who had great influence in Pitt's ministry, and was employed in important embassies. He began his career in 1778 as a mediator between the mother country and the insurgent colonies in North America. He was accompanied by Lord Howe, and Sir Henry Clinton, G. Johnstone, and Lord Carlisle upon this important embassy; but the result did not answer the expectations which had been formed from the talents of these distinguished men, and nothing was left for England but to acknowledge the independence of the colonies. Afterwards, as a member of Parliament, he had a great influence in the reform of the penal laws, and, with Howard and Blackstone, in the organization of a new system of police, and a better mode of treating prisoners. He subsequently held the important post of secretary of state for Ireland, and in 1785 was ambassador extraordinary to the French court to negotiate a commercial treaty, which was concluded in 1786. During the first year of the French revolutionary war he was ambassador extraordinary to the states-general of the Netherlands; and in this capacity he had the greatest influence on the measures which the course of events was constantly rendering more complicated. After his return his conduct was subjected to an investigation by Parliament, and was declared to be unexceptionable. He died in 1814, aged seventy years.

AUCTION is a public sale to the party offering the highest price where the buyers bid upon each other, or to the bidder who first accepts the terms offered by the vendor where he sells by reducing his terms until some one accepts them. This mode of sale was in use among the Romans, called *sub hasta*, from its being in early times a sale of the spoils taken in war under a spear erected as the signal of the auction. The same signal was afterwards used in other sales, which were made under the superintendence of particular tribunals. This mode of selling is subject to particular regulations by the laws of many communities, the object of which is to prevent frauds or to levy a tax.

AUCTIONEER, a person who conducts sales by auction. It is his duty to state the conditions of sale, to declare the respective biddings, and to terminate the sale by *knocking down* the thing sold to the highest bidder. An auctioneer is held to be lawfully authorized by the purchaser to sign a contract for him, whether it be for lands or goods. And his writing down the name of the highest bidder in his book, is sufficient to bind any other person for whom the highest bidder purchased, even though such person be present, provided he do not object *before entry*. In Britain an auctioneer must have a license (for which he pays £10), renewable annually. It has long been a common practice at certain auctions (called therefore *mock* auctions) to employ *puffers*, or mock bidders, to raise the value of the articles sold by their apparent competition, and many questions have grown out of it. It was long ago decided, that if the owner of an *estate*, put up to sale by auction, employ puffers to bid for him, it is a fraud on the real bidder, and the highest bidder may refuse to complete his contract. But it seems as if the mere employment of puffers under any circumstances were now held to be illegal. 'The inclination of the courts at the present time is that a sale by auction should be conducted in the most open and public manner possible; that there should be no reserve on the part of the seller, and no collusion on the part of the buyers. Puffing is illegal, according to a late case, even though there be only one puffer; and it was then decided that the recognized practice at auctions of employing such persons to bid upon the sale of horses could not be sustained' (Woolrych on Commercial Law, p. 262). A party bidding at an auction may retract his offer at any time before the hammer is down. Another clearly established principle is, that verbal declarations by an auctioneer are not to be suffered to control the printed conditions of sale; and these, when pasted up under the box of the auctioneer, are held to be sufficiently notified to purchasers. Auctioneers, like all other agents, should carefully observe their instructions. Should those who employ them sustain any damage through their carelessness or inattention, they will be responsible. They must also answer for the consequences if they sell the property intrusted to their care for less than the price set upon it by the owners or in a way contrary to order. The establishment of mock auctions is said to be a common practice among swindlers in London. Persons are frequently placed at the doors of such auctions, denominated *barkers*, to invite strangers to come in; and puffers are in wait to bid up the article much beyond its value. A stranger making an offer at such an auction is almost sure to have the article knocked down to him. Plated goods are often disposed of at these auctions; but it is almost needless to add that they are of very inferior quality. Attempts have sometimes been made to suppress mock auctions, but hitherto without much success, in consequence of the numerous means of evasion.

AUDE, a department in the S. of France, formed of a part of Lower Languedoc, and bounded N. and N.E. by Herault and Tarn, E. the Mediterranean, N.W. Haute-Garonne, W. Ariége, and S. Pyrénées-Orientales; greatest length, N. to S., 76 miles; breadth, 50 miles; area, 2437 square miles; pop. in 1906, 308,327. The surface is covered by three mountain groups, the Montagnes-Noires, a continuation of the Cevennes in the N., the Corbières in the E., and the Pyrenees in the S., and is traversed W. to E. by a great longitudinal valley, drained in its upper part by the Fresquel, and in its lower by the Aude. The loftier districts are bleak and unproductive; the others tolerably fertile, yielding good crops of wheat, maize, oats, and rye. The vine is extensively cultivated, the olive very partially. The wines, both white and red, but especially the former, bear a good name. Much land is kept in natural or artificial meadows. The minerals include copper, lead, iron, coal, and slate, and much salt is made, both for home consumpt and exportation, from the lagoons on the coast.

AUDE, a river, France, which gives name to the above department, issues from the Etang-de-l'Aude, Pyrénées-Orientales, about 4 miles N.W. of Montlouis, flows first N. to Carcassonne, then E., nearly parallel to the canal of Languedoc, and falls into the Mediterranean, after a course of nearly 130 miles. It receives several affluents, of which the principal is the Orbieu.

AUDEBERT, Jean Baptiste, united in a high degree the talents of an engraver with the knowledge of natural history. He was born at Rochefort in 1759, went at the age of eighteen to Paris to learn drawing and painting, and made himself a skilful miniature painter. In 1789 he became acquainted with Gigot d'Orcy, a great lover and promoter of natural history, who possessed a vast collection, the rarest specimens of which he employed Audebert to paint, and afterwards sent him to England and Holland, whence he brought back a number of designs which have been used in Oliver's History of Insects. This occupation awakened in him a taste for natural history. He now undertook some works which laid the foundation of his fame. The first was Histoire Naturelle des Singes, des Makis, et des Galéopithéques (Paris, 1800, folio), in which he shows himself

an able draughtsman, engraver, and writer. With regard to colouring, so essential in natural history, he brought it to a greater perfection than it had ever before attained. Not satisfied with laying different colours on the same plate, so as to produce a kind of painting, he went farther, and, instead of water-colours, used the more durable oil colours. He carried his art to still greater perfection by using gold in his impressions, the colour of which he changed in different ways, in order to imitate the splendour of his patterns. Natural history was greatly benefited by his work, the splendour of which was astonishing. His Histoire des Colibris, des Oiseaux-Mouches, des Jacamars, et des Promerops (Paris, 1802, folio), is esteemed the most complete work that has appeared in this department. Fifteen copies were struck off with golden letters. Scarcely was this work begun when Audebert formed new plans, for the execution of which the longest life would hardly have been sufficient. He died in 1800, when he had scarcely begun the Histoire des Grimpereaux et des Oiseaux de Paradis. Both works were excellently finished by Desray, who was in possession of the materials, and acquainted with the process of carrying on the work. Audebert rendered much assistance in the publication of Levaillant's African Birds.

AUDENSHAW, a town of England, in Lancashire, about 4 miles east of Manchester, with cotton-mills, engineering works, &c. Pop. (1901), 7216.

AUDIENCE, a formal interview granted by a sovereign to a subject, or generally by one in a superior position to an inferior. The Court of Audience was formerly one of the ecclesiastical courts in England, held by the archbishop, now merged in the Court of Arches.

AUDITOR, as a technical and business term, signifies a person appointed to examine or scrutinize accounts, or statements set forth in figures, such as those professing to show the financial dealings and position of merchants, joint-stock companies, insurance associations, friendly or industrial societies, and the like. Auditors are usually persons who are skilled accountants by profession, and in regard to the auditing of accounts of certain societies it is by law compulsory to employ such. With the increase in the number of limited liability companies there has been a great increase in the field of employment for auditors, since such companies are bound to make use of their services. An auditor has to make a proper examination of books, accounts, vouchers, securities, &c., and must report on the true financial position at the time of his investigation. See ACCOUNTANT (in SUPP.). In Britain the public accounts are audited in the Exchequer and Audit Department, so as to ensure that money voted by parliament has been properly expended, and generally to verify the correctness of the national accounts.

AUDUBON, JOHN JAMES, a celebrated American naturalist of French extraction, born near New Orleans in 1775, was educated in France, and studied painting under the celebrated David. On his return to America his father gave him a residence on the banks of the Schuylkill, but having a decided taste for ornithology, he determined to select a spot where he could have better opportunities of studying it, and accordingly in 1810 set out with that view, taking with him his wife and infant son. He descended the Ohio, and at last fixed on a site in Kentucky. Keeping this as his central locality, he continued for many years roaming the forests in every direction and drawing the undescribed birds which he shot. In 1826 he resolved to publish the result of his labours, and proceeded to England with his portfolio of magnificent drawings. His publication of them in a superb work of double folio size forms an era in ornithology. The plates were in four volumes (1827–38), and there was an accompanying text in five, largely the work of Prof. W. Macgillivray. The whole was republished in seven vols. 8vo in 1840–44. Audubon returned to America in 1829, revisited England in 1831, and after his final return to America in 1839 he settled on the Hudson, and laboured with Dr. Bachman on a work entitled the Quadrupeds of America. He died at New York in 1851. See the life by Robert Buchanan.

AUERBACH, HENRY, born in 1482, at a place of the same name in Bavaria, the builder of the Auerbach Court and Cellar at Leipzig, mentioned in Goethe's Faust. His real name was Stromer, but according to the fashion of his time, he took the name of the place where he was born. The building was erected in 1530, and tradition reports that five years after Dr. Faust was seen riding out of it on a barrel of wine. This tale Goethe has made use of in his famous poem. The building was known also at the Leipzig fairs as one of the most frequented places for the exhibition of merchandise.

AUERSTÄDT, battle at, Oct. 14, 1806. See JENA.

AUGEAN CODEX (*Codex Augiensis*), a Greek and Latin MS. of the Epistles of St. Paul, supposed by Michaelis to have been written in the ninth century, and so called from *Augia Major*, the name of a monastery at Rheinau, to which it belonged. After passing through several hands it came in 1718 to Dr. Bentley, who purchased it for 250 Dutch florins, and it is now in the library of Trinity College, Cambridge. This MS. is written in uncial letters, and without accents; not *continua serie*, as is common with the more ancient copies, but with intervals between the words, and a dot at the end of each. The Greek text is written in capitals, the Latin in Anglo-Saxon letters; whence it is tolerably clear that it must have been written in the w. of Europe, where that formation of the Latin letters, usually called *Anglo-Saxon*, was in general use between the seventh and twelfth centuries. The manuscript is defective from the beginning to Romans iii. 8, and the Epistle to the Hebrews is only found in the Latin version.

AUGEAS, in fabulous history, a King of Elis, famed for his stable, which contained 3000 oxen, and had not been cleaned for thirty years. Hercules was desired to clear away the filth in one day, and Augeas promised if he performed it to give him a tenth part of the cattle. This task Hercules is said to have executed by turning the river Alpheus, or, as some say, the Peneus, through the stable, which immediately carried away the dung and filth. Augeas not only refused to perform his engagement, pretending that Hercules had used artifice, and experienced no labour or trouble, but banished his own son Phyleus from his kingdom for supporting the claims of the hero. Upon this a war commenced, and Hercules conquered Elis, put Augeas to death, and gave his kingdom to Phyleus.

AUGEREAU, PIERRE FRANÇOIS CHARLES, Duke of Castiglione, Marshal of France, son of a fruit-merchant, born at Paris, 1757; served as a carabinier in the French army; went from thence into the Neapolitan service, established himself at Naples in 1787 as a fencing-master, and was banished thence in 1792 with the rest of his countrymen. He served afterwards as a volunteer in the army of Italy, in which his talents and courage soon gained him promotion. He distinguished himself in 1794 as general of brigade in the army of the Pyrenees, and in 1796 as general of division in the army of Italy. He took the Pass of Millesimo; made himself master, April 16, of the intrenched camp of the Piedmontese at

Ceva, afterwards of that at Casale; threw himself on the Bridge of Lodi, and carried it with the enemy's intrenchments. June 16 he passed the Po, and made prisoners the Papal troops, together with the cardinal legate and the general staff. Aug. 1 he came to the assistance of Masséna; maintained during a whole day a most obstinate struggle against a superior number of troops, and took the village of Castiglione, from which he derived his ducal title. Aug. 25 he passed over the Adige, and drove back the enemy as far as Roveredo. In the battle of Arcole, when the French columns wavered, Augereau seized a standard, rushed upon the enemy, and gained the victory. The directory bestowed this standard on him, Jan. 29, 1797. Aug. 9 he was named commander of the 17th military division (division of Paris), in place of General Hatry. He was the instrument of the violent proceedings of the 18th of Fructidor, and was saluted by the decimated legislative body as the saviour of his country. In 1799 he was chosen a member of the Council of Five Hundred, and therefore resigned his command. He then obtained from the consul Bonaparte the command of the army in Holland. He led the French and Batavian army on the Lower Rhine to the support of Moreau, passed the river at Frankfort, and fought with the imperial general with various success, until the battle of Hohenlinden ended the campaign. Being superseded by General Victor, in October, 1801, he remained without employment till 1803, when he was appointed to lead the army collected at Bayonne against Portugal. When this enterprise failed, he went back to Paris, and, May 19, 1804, was named marshal of the empire, and grand officer of the Legion of Honour. In July of this year the King of Spain sent him the order of Charles III. At the end of 1805 he was at the head of a corps of the great army in Germany, formed of troops collected under his command at Brest. He contributed to the successes which gave birth to the peace of Pressburg, and in March, 1806, had possession of Wetzlar and the country around, until, in the autumn of this year, a new war called him to Prussia. The wounds which he received in the battle of Eylau (which see) compelled him to return to France. Early in 1811 Napoleon gave him the command of a corps in the army of Spain. Afterwards he returned from thence, and remained without any employment until July, 1813, when he led the army in Bavaria against Saxony, where he took part in the battle of Leipzig. After the entrance of the allies into France, he made submission to Louis XVIII., who named him a peer. He also used reproachful language respecting Napoleon in a proclamation to his army. The emperor, therefore, on his landing in 1815, declared him a traitor. Augereau, however, expressed himself in his favour, but took no active part in the new order of things. After the return of the king he took his place again in the chamber of peers, but refused to become one of Ney's judges, was for a while unoccupied, and died, June 12, 1816, at his estate La Houssay, of the dropsy.

AUGIAS. See AUGEAS.

AUGITE, or PYROXENE, the name of a species of mineral, interesting on account of its wide distribution, and the numerous varieties of form and colour under which it appears. When crystallized it assumes the form of short, slightly rhombic prisms, with their lateral edges replaced, and terminated at one or both extremities by numerous planes. Its specific gravity is from 3·23 to 3·34; its lustre vitreous; and its hardness sufficient to scratch glass. Different names have been applied to some of its most remarkable varieties; as *diopside*, to greenish-white, transparent crystals; *sahlite*, when it is in imperfectly prismatic and foliated masses; and *coccolite*, when in small, slightly cohering grains. This species occurs abundantly in black crystals in basalt and lava, and enters into the regular composition of many rocks, besides being found in veins in primitive rocks. It is composed essentially of silica, lime, and magnesia, to which oxide of iron is sometimes added; and is one of those few mineral substances whose composition may be imitated by the artificial mixture of its constituents, and subjection of them to fusion. Its native crystals, likewise, when fused and suffered to cool slowly, reassume their original shape and colour. A transparent green variety, found at Zillerthal, in the Tyrol, is used in jewelry.

AUGSBURG (Latin, *Augusta Vindelicorum*), a city of Bavaria, on rising ground in the angle formed by the Wertach and Lech, and in the midst of wooded alleys, walks, and gardens, 35 miles N.W. of Munich. It was formerly surrounded by fortifications, and contains, with many very irregular, several very handsome streets and squares. Of the former the finest is Maximilians-Strasse, which, with its continuation the Karolinen-Strasse, is both long and spacious, adorned by three fine fountains, and possessed of many handsome buildings. One of the chief is the cathedral, an irregular Gothic pile begun in 995, with many interesting features, including old stained glass, paintings, and sculptures. The town-hall (1616–20) is an Italian structure, regarded as the finest civic palace in Germany. Adjoining the town-hall is a lofty belfry, called the Perlach Tower, erected in 1063. Among other buildings of note are St. Ulrich's Church, with a tower 350 feet high; the Protestant church of St. Anna; the bishop's palace, where the Augsburg Confession was presented to the diet; the arsenal, royal palace, law courts, public library (200,000 vols.), museum, Academy of Arts, theatre, and the Fugger Palace or mansion of the Fugger family. The Fuggerei, a range of houses built by them for poor people, forms a quarter by itself. Augsburg has been long distinguished by its commercial spirit, and though not now so important a place as formerly, it is still the seat of extensive manufactures and commerce. The chief branches of industry are cotton-spinning and weaving, bleaching and dyeing, the woollen manufacture, manufacture of paper, machinery, leather, tobacco, gold and silver wares, brass, chemicals, &c., and there are over 70 breweries. An extensive trade is done in printing, engraving, &c., but the Allgemeine Zeitung or Augsburg Gazette, perhaps the most famous newspaper of Germany, is now published at Munich. The city owes much of its importance to banking operations, in which its transactions are very extensive. It is also an emporium of merchandise, and has an extensive transit trade.—Augsburg is a place of great antiquity, a Roman colony having been established here about 15 B.C., in the reign of the Emperor Augustus. Ravaged by the Huns in the fifth century, it subsequently came under the supremacy of the Frankish kings, and was nearly destroyed in 788 in the war of Charlemagne against Tassilo, duke of Bavaria. After the division of the empire of the Franks, Augsburg came under the dominion of the Duke of Swabia, and becoming rich by its commerce finally purchased its freedom of the duke, which was afterwards confirmed by the emperor. The city now reached the summit of its prosperity, and was, together with Nürnberg, a great mart for the commerce between the N. and S. of Europe, until, towards the end of the fifteenth century, the discoveries of the Portuguese and Spaniards gave a new direction to the whole commerce of the world. In 1368, in consequence of the opposition of the lower classes of

citizens, the aristocratic government was abolished, and a democratic form substituted, which continued till 160 years later, when the nobles, with the assistance of the Emperor Charles V., again obtained the supremacy. Augsburg early took a conspicuous part in the Reformation, with which, for a long series of years, its history is closely connected. Here, in 1530, the celebrated Augsburg Confession (see next art.) was presented to Charles V.; and here, in 1555, was concluded the celebrated treaty which secured to the Protestants the full enjoyment of their rights and privileges. Pop. (1900), 89,109; (1910), 122,694.

AUGSBURG CONFESSION, a document presented by the Protestants at Augsburg, 1530, to the Emperor Charles V. and the diet, and being signed by the Protestant states, adopted as their creed. Luther made the original draught at the command of John, elector of Saxony, at Torgau, in seventeen articles; but as its style appeared to be too violent, it was altered by Melanchthon, at the command of the elector, and in compliance with the wishes of the body of Protestant princes and theologians. Thus changed it was presented and read in the diet, June 25. The original is to be found in the imperial Austrian archives, and the edition of the Augsburg Confession at Wittemberg, 1531, was printed from this. Afterwards Melanchthon arbitrarily altered some of the articles, and a new edition, with his changes appeared in 1540. There now arose a division between those who held the original and those who held the altered Augsburg Confession. The former is received by the Lutherans, the latter by the German Reformed, who thereby secured to themselves at the religious peace of 1555, the privileges extended only to the adherents of the Augsburg Confession, and kindred sects.

AUGURS, certain priests among the Romans, who, from the flight and the cries of birds, from lightning, &c., predicted future events, and announced the will of the gods. They were consulted respecting both public and private concerns, and their respectability, as well as their influence in the state, was very great. By merely pronouncing the words *Alio die* (another day), they could dissolve the assembly of the people, and annul all the decrees which had been passed at the meeting. Their answers, as well as the signs by which they governed themselves, were called *auguries*. Public auguries were, 1. Appearances in the heavens, as thunder and lightning. The augur remarked the place where the flash of lightning originated, and where it disappeared. He stood on an elevated place (*arx*, *templum*), where he had a full view of all around him. After the sacrifices had been made, and solemn prayers offered, he took his station, his face towards the E., his head covered, and pointing with his staff (*lituus*) to that portion of the heavens within the limits of which he proposed to make his observations. On the left were the propitious, on the right the unpropitious omens. 2. The cries and the flight of birds. Predictions founded on the observation of birds were properly called *auspices*, and were very common even among the Greeks, who took them from the Chaldeans. They afterwards became so important that among the Romans nothing of consequence in peace or in war was undertaken without consulting birds, whose continual flight was supposed to give them universal knowledge. They were propitious or unpropitious, either from their species or from the circumstances in which they appeared. The birds of a prophetic character were divided in two principal classes—those whose flight and those whose cry was indicative of future events. In the latter class were included the raven, the crow, the night-owl, the cock; in the former were the eagle, the crow, the raven, the kite, and the vulture. The two last were always unpropitious; the eagle, on the contrary, was propitious when he flew from left to right; the crow and the raven were propitious on the left, and unpropitious on the right. 3. The willingness or unwillingness of chickens to eat was also ominous. The former was interpreted as a good omen, the latter as a bad one. Chickens were made use of particularly in war; therefore a pontifex, some augurs and aruspices (see ARUSPICE), together with a *pullarius* with a hen-coop, were attached to the army. Besides these three principal classes, certain omens were drawn from quadrupeds; for example, if a beast crossed one's path, or was seen in an unusual place; and from many occurrences more or less uncommon, for example, sudden melancholy, sneezing, spilling the salt on the table, &c. The augurs explained such signs, and taught how the gods were to be appeased. The right of taking the auspices, that is, the right to inquire of the gods, by certain signs, how the war would terminate, belonged only to the commander-in-chief. The inferior officers fought only under his auspices; that is, the declaration which he issued was binding upon them, and the fortunate or the unfortunate issue of the war was attributed to him alone.

AUGUST, the name of the eighth month from January, inclusive, and the sixth of the Roman year, which began with March. It was called *Sextilis* till the emperor Augustus, in consideration of the many instances of good fortune which had happened to him in this month, affixed to it his own name.

AUGUSTA, the name of a very great number of ancient places, as Augusta Trevirorum, now *Treves;* Augusta Ausciorum, now *Auch;* Augusta Taurinorum, now *Turin;* Augusta Suessonum, now *Soissons;* Augusta Vindelicorum, now *Augsburg;* &c. Augusta also is the name of many modern places and rivers in South America.

AUGUSTA, capital of Maine, in the United States, on both sides of the river Kennebec, 43 miles from its mouth, and 63 miles from Portland. It is a pleasant and flourishing town, with a handsome state-house commanding a fine prospect, a good court-house, handsome lunatic asylum, an arsenal, &c. Lumber is largely made, and there is a large cotton-mill, &c. A large dam constructed across the river gives a great amount of water-power for manufacturing purposes. Here is a bridge across the Kennebec, consisting of two arches, each of 180 feet span. The river is navigable to Augusta. Pop. (1900), 11,683.

AUGUSTA, a city and capital of Richmond county, Georgia, United States, on the left bank of the Savannah River, 231 miles from its mouth. The streets are wide, intersecting each other at right angles, and are ornamented with trees. The houses are mostly of brick, and many of them are spacious and elegant. Among the public buildings are a fine city-hall, Richmond Academy, a court-house, a theatre, oddfellows' hall, masonic hall, medical college, and some handsome churches. Augusta is favourably situated for trade, and has a very flourishing commerce by rail and river, especially in cotton. It is an important manufacturing centre, having cotton-mills, car-factory, machine-shops, and railroad works, foundries, flour-mills, &c. Pop. (1910), 41,040.

AUGUSTINE, or AUSTIN, ST., called the *Apostle of the English*, flourished at the close of the sixth century and beginning of the following. When prior of the monastery of St. Andrew at Rome, he was sent, in 596, with forty monks, by Pope Gregory I., to introduce Christianity into the Saxon kingdoms of England. He was kindly received by Ethelbert, king of Kent, whose wife Bertha (a daughter of Charibert, king of Paris) was already a Christian, and whom he soon converted; and such was his

success with Ethelbert's subjects, that he is said to have baptized 10,000 in one day. He was consecrated Bishop of the English, and founded two monasteries at Cambridge. In 601 Augustine became the first Archbishop of Canterbury, having received the archiepiscopal pall from the pope, with instructions to establish twelve sees in his province, the intention being that there should also be a northern province with other twelve sees. More missionaries were sent from Rome at the same time, in hopes of spreading Christianity amongst the other English kingdoms; and an attempt was made to unite the Christians in Wales, successors of the British converts of the second century, with the new English church. The Welsh clergy differed from the Roman in regard to the time of keeping Easter, and some other points, and they preferred to remain apart. Augustine died in 604, continuing his missionary labours to the last. The chief authority for his life is Bede.

AUGUSTINE, St. (Aurelius Augustinus), one of the most renowned fathers of the Christian church, was born at Tagaste, in Numidia, November 13, 354, his father, Patricius, being then a pagan, his mother, Monica, a Christian. He has related his own early life in the work to which he gave the title of Confessions. His mother instructed him in Christianity, but for many a year this faith had little influence on his life. He was long devoted to pleasure, and when quite young became father of a son by a woman with whom he was not connected by marriage. He was intended for the profession of rhetorician, and was sent to Carthage to study with this object in view. Cicero's work Hortensius, which has not come down to our times, first led him to speculative studies, and he now became a member of the sect of the Manichæans. He was one of their disciples for nine years; but after having obtained a full knowledge of their doctrine, he found it unsatisfactory and left them. In 383 he left Africa for Rome, and after a short stay there proceeded to Milan, where he was invited as a teacher of rhetoric. St. Ambrose was bishop of this city, and his eloquent discourses, combined with the study of the Scriptures, converted Augustine to the orthodox faith, and wrought an entire change in his life and character. His conversion appears to have taken place in 386. He now retired into solitude, and prepared himself for baptism, which he received in the thirty-third year of his life, together with his son Adeodatus, from the hands of Ambrose, his mother being then with him. Returning to Africa, he sold his estate, and gave the proceeds to the poor, retaining only enough to support him in a moderate manner. For three years he lived a sort of monastic life, devoting himself to religious duties, and to the composition of several treatises. Chancing on one occasion to be present in the church at Hippo, the bishop, who was a very old man, signified a desire to consecrate a priest to assist and succeed him. At the desire of the people Augustine entered upon the holy office, preached with extraordinary success, and in a few years became Bishop of Hippo. The remainder of his life was occupied with his ecclesiastical labours, and with various controversies in which he warmly engaged, such as those with the Donatists, the Manichæans, and more especially the Pelagians (see Pelagianism), concerning the doctrines of free-will, grace, and predestination. Augustine maintained that men were justified through grace, and not through good works, and he also supported the doctrine of predestination, including election and reprobation, his teaching thus resembling that generally associated with Calvinism. His authority has been at all times unbounded in the Catholic Church, insomuch that, according to Petavius, it is considered a sufficient proof of the truth of any dogma that Augustine taught it. He died at Hippo, August 28, 430, while the town was besieged by the Vandals. There have been fathers of the church more learned, masters of a better language and a purer taste, but none have ever more powerfully touched the human heart, and warmed it towards religion. Painters have therefore given him for a symbol a flaming heart. His writings (which are in Latin) are very numerous. His defects were narrow-mindedness, intolerance, and a domineering spirit in ecclesiastical affairs. The most celebrated are his Confessions (belonging to the year 397), his De Civitate Dei (On the City of God), a work on the Christian church, his treatise on the Trinity, and his Letters. His works have been published at Paris in 22 vols., and an English translation in 15 vols. has appeared at Edinburgh, edited by Dr. Marcus Dods. See also Neander's Church History, Milman's Latin Christianity, Farrar's Lives of the Fathers, &c.—Two monastic bodies, the *Augustinian Canons*, or *Black Canons*, and the *Augustinian Hermits*, claimed to derive their origin from St. Augustine. The latter still have a certain number of houses.

AUGUSTULUS, Romulus, son of Orestes, a general of the Roman emperor Julius Nepos. Orestes deposed the emperor, and placed his son upon the throne, in 475. In the following year Odoacer, a commander of the German forces in the Roman service, revolted, put Orestes to death, obliged Augustulus to resign, and thus put an end to the Roman Empire in the West. The emperor's name was originally Romulus Augustus, but the Romans changed the latter into the diminutive form Augustulus, out of contempt for his character.

AUGUSTUS, Caius Julius Cæsar Octavianus, originally called *Caius Octavius*, the celebrated Roman emperor, was the son of Caius Octavius and Atia, a daughter of Julia, the sister of Julius Cæsar. The Octavian family originated at Velitræ, in the country of the Volscians. The branch to which Octavius belonged was rich and distinguished. His father had risen to the rank of senator, and had gone to Macedonia, after being chosen prætor, where he was distinguished as a civil and military officer. Octavius was born during the consulate of Cicero (63 B.C.). He lost his father when young, but was very carefully brought up at Rome by his mother and L. Marcius Philippus, the second husband of Atia. His talents gained him the regard of his great-uncle, Julius Cæsar, who declared himself willing to adopt him for his son, in case he himself should remain without children. Octavius was at Apollonia, in Epirus, where he was studying eloquence under the renowned orator Apollodorus, when he received the news of the tragical death of his uncle, and of his having adopted him as his son. Notwithstanding the anxiety of his friends, he went over to Italy, in order, if circumstances should favour him, to satisfy the hopes which he had entertained from being adopted by Julius Cæsar. When he landed at Brundusium, deputies from the veterans collected there came to him. Conducted in triumph to the city, and saluted as the heir and avenger of Cæsar, he made his adoption publicly known, and took the name of his uncle, adding to it that of *Octavianus*. He placed himself, then only nineteen years old, at the head of the veterans, possessed himself of all the public money in Brundusium, and advanced through Campania to Rome. Here there were two parties, that of the republicans, who had killed Cæsar, and that of Antony and Lepidus, who, under the pretence of avenging him, strove to establish their own authority. The latter party became victorious, and the consul, Antony, exercised almost unlimited power. Octavianus addressed him-

self first to Cicero, who had retired to his villa at Cumæ, being desirous to gain over this great orator, always beloved by the people, and whom Antony hated and feared. From thence he went to Rome, where the greater part of the magistrates, soldiers, and citizens came to meet him, Antony alone paying no attention to his return. After Octavianus had caused his adoption to be confirmed in the most solemn manner, he went to Antony, who had taken possession of Cæsar's papers and property, and demanded of him the inheritance left him, in order to pay the legacies mentioned in his uncle's will. Antony at first haughtily refused to acknowledge his claims, but afterwards changed his demeanour when he found the influence of Octavianus continually increasing, and his own proportionably diminishing. There could be no real union, however, between two equally ambitious rivals. In their hearts they cherished reciprocal hatred and jealousy; and their enmity was so little a secret, that Octavianus was accused of having wished to get Antony murdered. How the latter went to Cisalpine Gaul, besieged Mutina, and was declared an enemy to his country while absent from Rome; how Octavianus, who had obtained the most powerful party in the senate, accompanied the consul sent against Antony, and, after the death of the consul, took the chief command; how he afterwards, when Antony, together with Lepidus, entered Italy at the head of a powerful army, united with him; how a triumvirate was formed by the three generals; and how, after dreadful scenes of blood in Rome and the rest of Italy, they defeated the republican army under Brutus and Cassius, at Philippi in Macedonia (B.C. 42);—all this is contained in the article on Antony. After his return to Rome he satisfied the demands of his soldiers by dividing among them confiscated lands. This division caused great disturbances. In the midst of the stormy scenes which convulsed Italy, he was obliged to contend with Fulvia, whose daughter, Clodia, he had rejected, and with Lucius, the brother-in-law of Antony. After several battles, Lucius threw himself into the city of Perusia, where he was soon after obliged to surrender. The city was given up to be plundered, and three hundred senators were condemned to death, as a propitiatory sacrifice to the manes of the deified Cæsar (B.C. 40). After the return of Antony, an end was put to the proscriptions. Octavianus allowed such of the proscribed persons as had escaped death by flight, and whom he no longer feared, to return. There were still some disturbances in Gaul, and the naval war with Sextus Pompeius continued for several years. About this time Octavianus married the famous Livia, the wife of Claudius Nero, whom he compelled to resign her, after he himself had divorced his third wife, Scribonia. By a skilful course of conduct he brought about the defeat of Pompeius and reduced Lepidus to a nullity, thus leaving Antony alone as his rival. The empire was now divided between him and Antony; but while the former, in the East, gave himself up to a life of luxury, the young Octavianus pursued his plan of making himself sole master of the world. He especially strove to obtain the love of the people. He showed mildness and magnanimity, without the appearance of striving after the highest power, and declared himself ready to lay down his power when Antony should return from the war against the Parthians. He appeared rather to permit than to wish himself to be appointed perpetual tribune—an office which gave him supreme power. The more he advanced in the affections of the people, the more openly did he declare himself against Antony. By making public a will, wherein his rival appointed his sons by Cleopatra his heirs, he stirred up the ill-will of the Romans against him. Availing himself of this feeling, Octavianus declared war against the Queen of Egypt, and led a considerable force, both by sea and land, to the Ambracian Gulf. Here his admiral Vipsanius Agrippa gained the naval victory of Actium (which see), which made Octavianus master of the world, B.C. 31. He pursued his rival to Egypt, and ended the war, after rejecting the proposal of Antony to decide their differences by a personal combat. Cleopatra and Antony killed themselves. Octavianus caused them to be splendidly buried. A son of Antony and Fulvia was sacrificed to ensure his safety. Cæsarion, a son of Cæsar and Cleopatra, shared the same fate. All the other relations of Antony remained uninjured, and Octavianus, on the whole, used his power with moderation. He spent two years in the East, in order to arrange the affairs of Egypt, Greece, Syria, Asia Minor, and the islands. On his return to Rome he celebrated a triumph for three days in succession, and (B.C. 29) closed the temple of Janus—for the third time since the foundation of Rome. Freed from his rivals and enemies, and master of the world, he is said to have been undecided as to how he should exercise his power, or whether he should even retain it. He first set about correcting the abuses which had prevailed during the civil war, established a general peace, ejected unworthy members from the senate, restored ruined temples, and built new ones. At the end of his seventh consulship, he entered the senate-house, and declared his resolution to lay down his power. The senate, astonished at his moderation, besought him to retain it. He yielded to their pressing entreaties, and continued to govern through them. He now obtained the surname of Augustus, which marked the dignity of his person and rank, and united, by degrees, in himself, the offices of imperator, or commander-in-chief by sea and land, with power to make war and peace; of proconsul over all the provinces; of perpetual tribune of the people, which rendered his person inviolable, and gave him the power of interrupting public proceedings; and, in fine, of censor, and pontifex maximus, or controller of all religious matters. The laws themselves were subject to him, and the observance of them depended upon his will. To these dignities we must add the title of *father of his country*. Great as was the power given to him, he exercised it with wise moderation. It was the spirit of his policy to retain old names and forms, but he steadfastly refused to assume the title of *dictator*, which latterly had become especially odious. Augustus conducted many wars in Africa, Asia, and particularly in Gaul and Spain, where he triumphed over the Cantabrians after a severe struggle. His arms subjected Aquitania, Pannonia, Dalmatia, and Illyria, and held the Dacians, Numidians, and Ethiopians in check. He concluded a treaty with the Parthians, by which they gave up Armenia, and restored the eagles taken from Crassus and Antony. At the foot of the Alps he erected monuments of his triumphs over the mountaineers, the proud remains of which are yet to be seen at Susa and Aosta. After he had established peace throughout the empire, he again closed the temple of Janus. But this peace was interrupted, A.D. 9, by the defeat of Varus, who lost three legions in an engagement with the Germans, under Arminius, and killed himself in despair. The information of this misfortune greatly agitated Augustus. He let his beard and hair grow, and often cried out in the deepest grief, 'O Varus, restore me my legions!' Meanwhile the Germans were held in check by Tiberius. During the peace, Augustus had issued

many useful decrees, and abolished abuses in the government. He gave a new form to the senate, employed himself in improving the manners of the people, particularly by promoting marriage, enacted laws for the suppression of luxury, introduced discipline into the armies, and order into the games of the circus. He adorned Rome in such a manner that it was truly said, 'He found it of brick, and left it of marble.' He also made journeys, as Velleius says, everywhere, to increase the blessings of peace; he went to Sicily and Greece, Asia Minor, Syria, Gaul, &c.; in several places he founded cities and colonies. The people erected altars to him, and, by a decree of the senate, the month Sextilis was called August. Two conspiracies, which threatened his life, miscarried. Cæpio, Murena, and Egnatius were punished with death: Cinna was more fortunate, receiving pardon from the emperor. This magnanimity increased the love of the Romans, and diminished the number of the disaffected; so that the master of Rome would have had nothing to wish for, if his family had been as obedient as the world. The debauchery of his daughter Julia gave him great pain, and he showed himself more severe against those who destroyed the honour of his family, than against those who threatened his life. History says that, in his old age, he was ruled by Livia, the only person, perhaps, whom he truly loved. He had no sons, and lost by death his sister's son, Marcellus, and his daughter's sons, Caius and Lucius, whom he had appointed his successors. Also, Drusus, his son-in-law, whom he loved, died early; and Tiberius, the brother of the latter, whom he hated, on account of his bad qualities, alone survived. These numerous calamities, together with his continually increasing infirmities, gave him a strong desire of repose. He undertook a journey to Campania, from whose purer air he hoped for relief; but disease fixed upon him, and he died, at Nola (August 19, A.D. 14), in the 79th year of his age, and 45th of his reign. When he felt his death approaching he is said to have called for a mirror, arranged his hair, and demanded of the by-standers, 'Have I played my part well?' and, an answer being returned in the affirmative, 'Then,' added he, using the form of the players, 'farewell, and applaud' (*valete, et plaudite*). If this last passage in the life of Augustus is true, it is certainly indicative of his character, his policy, and even of his fortune. It is certain that his conduct was always measured and determined beforehand, and that he had a great power of remaining cool and unmoved amid the cares and agitations of government. Studiously concealing his own plans, he made use of the passions, as well as the talents of others, to further them. He conquered Brutus by means of Antony, and Antony by means of Agrippa. He several times changed his party, but never his purposes, and knew how to cause power to be offered, and pressed upon him, while it was, in fact, the object of all his exertions. It cannot be denied that he used his power with wisdom, and became the benefactor of his country, which he had previously plunged into the horrors of civil war. His taste and active mind led him to favour and protect the learned; and he even exercised the art of the poet himself; so that he was not unworthy of giving his name to an age distinguished for intellectual creations. His death plunged the empire into the greatest grief. He was numbered among the gods, and temples and altars were erected to him.

AUGUSTUS II., FREDERICK, Elector of Saxony and King of Poland, second son of John George III., elector of Saxony, born at Dresden, in 1670, was remarkable for his bodily strength and activity. To his residence in France he owed that taste for luxury and the fine arts which afterwards made the Saxon court inferior in splendour to none in Europe, except that of Louis XIV. In 1691 he visited Vienna, where he contracted a friendship with the Archduke Joseph, afterwards Joseph I. By the death of his elder brother, John George IV., in 1694, he became elector. The Polish throne having become vacant, in 1696, by the death of John Sobieski, Augustus presented himself as a candidate for it. The Abbé de Polignac, the French ambassador at Warsaw, supported the pretensions of the Prince of Conti, whom the Polish nobility preferred; but Augustus had an army on the frontiers, obtained votes by bribery, and publicly embraced the Catholic religion. June 27, 1697, the election took place. Augustus strengthened his party by marching 10,000 Saxons into Poland. Bribery and intimidation obtained him the victory. After he had ascended the throne, a treaty was concluded between Denmark, Poland, and the czar, Peter I., against Charles XII. of Sweden, in which the object was the conquest of Livonia. (See OLIVA.) But Charles, having defeated the Danes under the walls of Copenhagen, and the Russians at Narva, was now ready to advance into Poland, and Augustus was obliged to provide for the defence of his own dominions. Thus commenced the celebrated northern war, which lasted twenty years, in which Augustus, with his faithful Saxons, had to withstand the opposition of the Poles, as well as the valour of the Swede. Charles declared him a usurper, and thus separated the cause of the republic from that of the king, who obtained but little assistance from the Poles. The Swedes advanced to Clissow, between Warsaw and Cracow. Augustus had 24,000 men, Charles only half the number; but the Poles gave way in the beginning of the engagement, and Charles gained a complete victory, July 20, 1702. May 1, 1703, the Saxon army was defeated again at Pultusk. The diet assembled at Warsaw declared Augustus, Feb. 14, 1704, incapable of wearing the crown of Poland, and Stanislaus Lesczinsky, waywode of Posen, was chosen king, July 12, 1704. Charles, victorious on every side, advanced into Saxony, and Augustus found himself obliged to negotiate a secret peace, at Altranstadt, Sept. 24, 1706. Meanwhile the Russians, ignorant of these transactions, obliged Augustus to attack the Swedish general Mardefeld. He gained a signal victory at Kalisch, and entered Warsaw in triumph, at the time that the proposals of Charles were brought to him. However much he might desire to take advantage of his good fortune, it was too late. Saxony lay at the mercy of the Swedes. He signed the treaty, and, Dec. 18, 1706, visited Charles in his camp at Altranstadt. To complete his mortification, Charles compelled him to send to Stanislaus the jewels and archives of the crown, with a letter of congratulation. He returned to Dresden, where he soon after received an unexpected visit from Charles. Count Fleming, his first minister, advised him to make himself master of the person of his dreaded enemy, but he rejected the unjust proposal. He now devoted himself to the domestic affairs of Saxony. His love of splendour involved him in many expenses, by which the finances of his kingdom were disordered. In 1708 he served under an assumed name in a campaign against the French, in the Netherlands. In 1709, after the defeat of Charles at Pultawa, the Poles recalled Augustus, who united himself anew with Peter. These two monarchs, in alliance with Denmark, sent troops into Pomerania. Notwithstanding the exhausted state of Sweden, the Swedish general Steinbock gained a splendid victory over the allies at Gadebusch, Dec. 20, 1712, which compelled them to raise the siege of Wismar and Stralsund. Charles XII., having after-

wards returned from his residence in Turkey, and made known his determination to prosecute the war with vigour, an alliance, at the head of which was Augustus, was formed against him; but his death put an end to the war, and Augustus concluded a peace with Sweden. A confederation was now formed in Poland against the Saxon troops, by the party of Stanislaus, in the belief that Augustus was aiming at absolute power. The Saxons were attacked and obliged to surrender. At length, through the mediation of Peter, an arrangement was concluded at Warsaw, 1717, between Augustus and the Polish leaders. The Saxon troops were removed from the kingdom, and Augustus agreed not to maintain more than 17,000 soldiers in Poland, who were to be under the Polish authorities. Latterly he gave himself wholly up to voluptuousness and a life of pleasure. His court was one of the most splendid and polished in Europe. The Poles yielded but too readily to the example of their king, and the last years of his reign were characterized by boundless luxury and corruption of manners. We read with astonishment, even at this day, the descriptions of the entertainments given by him. It is related that he gave a regiment of dragoons to King Frederick William of Prussia for twelve porcelain vases. He was not disliked by his subjects, and filled with dignity his station among the European powers. In his character generous ideas were united with despotic feelings, a taste for pleasure with the cares of ambition, and the restlessness of a warlike spirit with the effeminacy of a luxurious life. Death surprised him in the midst of his pleasures and projects. On his journey to Warsaw to attend the diet, a small wound in his knee becoming inflamed, he died, Feb. 1, 1733, and was buried in Cracow. His wife, Christine Eberhardine, left him one son. By his mistresses he had many children. The Countess of Königsmark bore him the celebrated Maurice of Saxony. See COSEL (COUNTESS OF).

AUGUSTUS III., FREDERICK, Elector of Saxony and King of Poland, son of Augustus II., born at Dresden, 1696, succeeded his father as elector in 1733. Towards the end of this year Louis XV. endeavoured to replace Stanislaus Lesczinsky, whose daughter he had married, on the throne of Poland; but France was too far distant to send troops enough to Poland to support him. A part of the Polish nobility separated from the diet, and, supported by a Russian army, chose Augustus king; and in 1736 he was first generally recognized as such by the congress assembled at Warsaw to conclude a peace. Although without the great and amiable qualities of his father, in other respects he closely followed his example, distinguishing himself by the splendour of his feasts and the extravagance of his court. He squandered immense sums on pictures and musicians. Hunting was his passion. The cares of government he gave up to his favourite and prime minister, Count Brühl (which see), who was artful enough to persuade a monarch, weak, but proud and jealous of his dignity, that he alone exercised the supreme power. His system of politics consisted in entire dependence upon Russia. He preferred Dresden to Warsaw, and through his long absence from Poland the government sank into entire inactivity. Never were the annual diets more turbulent, and never were they so inefficient from the unbending obstinacy of the members, who continually opposed each other, under the most trivial pretexts. Augustus was satisfied if he could remain in his beloved Saxony, and thus the great Kingdom of Poland was almost entirely without a government for thirty years. In the midst of this confusion the Poles appeared to be satisfied and happy; but when Frederick II. had conquered Silesia, Augustus, disturbed by the rapidly increasing power of Prussia, united himself with the Queen of Hungary, by the treaties of Dec. 1742, May 13, 1744, and by that of Leipzig, May 18, 1745. He pledged himself, by means of the money which England and Holland were to pay him, to furnish her with 30,000 auxiliary troops, which he sent into Silesia, where they were united with the Austrian army, but were entirely defeated at Hohenfriedberg, June 4, 1745. Frederick now attacked Saxony itself, and Prince Leopold of Dessau defeated the Saxon army once more, Dec. 15, 1745, at Kesselsdorf, under the walls of Dresden. Augustus deserted his capital, and preserved his pictures and porcelain, but lost the archives of the state, which fell into the hands of the victors. By the peace of Dresden, Dec. 25, 1745, he was reinstated in the possession of Saxony, in the next year. In 1756 he saw himself involved anew in a war against Prussia. When Frederick declined his proposal of neutrality he left Dresden, Sept. 10, and entered the camp at Pirna, where 17,000 Saxon troops were assembled. Frederick surrounded the Saxons, who were obliged to surrender, October 14. Augustus fled to Königstein, and afterwards to Poland. His authority in this country had always been inconsiderable, and after the loss of Saxony, became still more insignificant. The accession of Catharine to the Russian throne was a new source of disquietude to him, for the great empress sought in every way to deprive the Saxon princes, who were allies of France, of the Polish throne. The peace of Hubertsberg was hardly concluded when Augustus returned from Warsaw to Dresden, where he was seized, Oct. 5, 1763, with a fit of the gout, which put an end to his life. He had, like his father, before his accession to the Polish throne (1712), embraced the Roman Catholic religion. His son, Frederick Christian, succeeded him as elector of Saxony, and Stanislaus Poniatowsky as King of Poland.

AUK (*Alca*), a genus of sea-birds, of the family Alcadæ, characterized by very short wings, and by having the legs placed so far behind the centre of the body that they stand nearly erect. They seldom leave the ocean, except at the breeding season, when they congregate in great numbers in caverns and on rocky cliffs, and lay only one very large egg. They live on small fishes, crustacea, vermes, mollusca, &c., which they obtain by diving, and feed their young from their crops both while in the nest and for some time after. The principal species was the great auk or gair-fowl (*A. impennis*), about 3 feet long, with a black bill measuring 4¼ inches, and having both mandibles crossed obliquely with ridges and furrows. It was remarkable for the imperfect development of its wings, which were not more than 4¼ inches from the tips of the longest quill feathers to the first joint. In summer the head, neck, and upper plumage was of a deep black, with the exception of a long white patch extending in front of the head and around the eyes; but in winter the cheeks, throat, forepart, and sides of the neck were white. The legs were black and short. Using its wings and feet as oars, it moved with great rapidity through the water, and on one occasion, when pursued by a six-oared boat, left it far behind. Its one egg was about the size of a swan's. The great auk is believed to be now extinct, no living specimens having been seen for fifty years. It used to breed in various northern localities in Europe and America. Its eggs now fetch large sums when bought by collectors. Another species of the genus Alca is the razor-bill (*A. torda*). It is little more than 15 inches long, and has the wings sufficiently developed to be used for flight. Its plumage is very similar to that of the great auk, and its egg about the

size of a turkey's but longer, is yellowish-white with dark-brown blotches and streaks chiefly near its larger end. It has a considerable range in the higher latitudes, and is often seen in great numbers on the Needles and other adjacent cliffs in the English Channel, and in the Isle of Man, where the ledges of the rocks rising one above another and the birds sitting upon them have been not unaptly compared by the Manxmen to the shelves and pots of an apothecary's shop. The largest swarms are, however, found in colder regions, and more especially on the coast of Labrador, where vast quantities of eggs are annually collected for food, and vast numbers of the birds are killed for the breast feathers, which are very warm and elastic. The two species above-mentioned are the only true auks, but the genera *Mormon*, *Mergulus*, and *Phaleris* belong to the same family, and include various species, of which the *Mormon fratercula*, Labrador auk or common puffin, belongs to the first, the *Mergulus* or *Arctica alle*, or little auk, belongs to the second, and the *Phaleris psittacula* or parrakeet auk, belongs to the third. See plate at article ORNITHOLOGY.

AULIC (from the Latin *aula*, used for *court*), an epithet given to a council in the ci-devant German Empire, the *Reichshofrath*. The Aulic Council was one of the two supreme courts of the German Empire, which first received a distinct form after the estates had obliged the emperor, in 1495, to establish the court of the imperial chamber (*das Reichskammergericht*). After the erection of this court the emperor still had, as before, officers who decided all disputes brought to him from his hereditary dominions, and from the empire at large. He, of course, would not allow the estates the same influence in the appointment of these officers which they exercised in the appointment of the members of the other court above-mentioned. But as his officers composing the Aulic Council took cognizance of judicial processes, the estates from the year 1502 and onwards made frequent complaints of it, but were not able to attain anything except more precision in its organization, especially by the decrees of the council, in 1559 and 1654. In the Peace of Westphalia it was acknowledged as a supreme court of the empire, equal to the court of the imperial chamber. It consisted of a president, a vice-president, and eighteen councillors, a part of whom at least were to be taken, not from Austria, but the other states of the empire. Six were to be Protestants: all were appointed and paid by the emperor. If the Protestant councillors were unanimous, the votes of the rest could not prevail against them. The councillors were divided into a bench of counts and lords, and a bench of learned men (*Gelehrte*), with no distinction, except that the latter, who generally were raised to the rank of nobles, had a higher salary. The vice-chancellor of the empire also, appointed by the archbishop elector of Mayence, had a seat in the Aulic Council, and a vote after the president. This court had not only concurrent jurisdiction with the court of the imperial chamber, but, in many cases exclusive jurisdiction: in all feudal processes, and in criminal affairs, over the immediate feudatories of the emperor, and in affairs which concerned the imperial government. The right of appeal, possessed by the estates, existed also in regard to the judicial decisions of the Aulic Court. With the death of an emperor this court ceased, and the next emperor established a new one. In the meantime, the regents of the empire constituted vice-aulic councils, which ceased again with the beginning of the new imperial government. The seat of this court was always the town in which the emperor resided for the time being, in later years accordingly in Vienna. There also were preserved the archives of the court, which were only separated from those of the Austrian state in 1740. Recently a portion of the acts of the Aulic Court have been handed over to the different German states to which they refer, on the petition of the states themselves.

AULIS, in ancient geography, a seaport in Bœotia, on the strait called *Euripus*, between Bœotia and Eubœa. Agamemnon assembled here the Greek fleet intended to sail against Troy. See IPHIGENIA.

AUNOY, or AULNOY, MARIE CATHERINE JUMELLE DE BERNEVILLE, COUNTESS D', born 1650, died 1705, was the author of Contes des Fées (Fairy Tales), which in their day met with great success in France, and have been translated into English. She also wrote a number of novels, historical memoirs, &c. Her style was easy and agreeable, but verbose. Her tales are often founded on fact. The critic cannot pardon the insipid gallantry of many of her heroes. But that was the fashion of the time. She was fond of developing her plots philosophically. Her husband was accused of treason by three of his tenants, was imprisoned, and subjected to a severe examination, and in danger of being condemned to death, when a mortal disease seized upon one of his accusers, who, to obtain absolution, confessed the falsehood of the whole accusation.

AURELIAN (LUCIUS DOMITIUS AURELIANUS), an emperor of Rome, distinguished for his military abilities and stern severity of character, was the son of a peasant of Illyricum. He was born about 212 A.D., and rose to the highest rank in the army, and even to the consulate; which good fortune was increased by a wealthy marriage. Claudius II., on his death-bed, in 270, recommended Aurelian to the choice of the troops of Illyricum, who readily acceded to his wishes. He delivered Italy from the barbarians, reduced Tetricus, who had been unwillingly made to assume the purple in Gaul, and conquered the famous Zenobia, queen of Palmyra. Owing to the ungenerous excuse of the queen, that she had waged war by the advice of her ministers, her secretary, the celebrated Longinus, was put to death by the victor; but, after having graced his triumphal entry, Zenobia herself was presented with a villa on the Tiber, and allowed to spend the remainder of her days as a Roman matron. Aurelian followed up his victories by the reformation of abuses, and the restoration throughout the empire of order and regularity, but tarnished his good intentions by the general severity of his measures, and the sacrifice of the senatorian order to his slightest suspicions. He had planned a great expedition against Persia, and was waiting in Thrace for an opportunity to cross the straits, when he lost his life, A.D. 275, by assassination, the result of a conspiracy excited by a secretary whom he intended to call to account for peculation. Aurelian was a wise, able, and active prince, and very useful in the declining state of the empire; but the austerity of his character caused him to be very little regretted. It is said that he meditated a severe persecution of the Christians, when he was so suddenly cut off, after a distinguished and eventful reign of only five years.

AURENGZEBE, or AURUNGZEBE (*ornament of the throne*), born in Oct. 1618 or 1619, received this title from his grandfather, Jehangir, who at that time was sovereign of Hindustan. When he was nine years old his weak and unfortunate father, Shah Jehan, succeeded to the throne. Aurengzebe was distinguished, when a youth, for his serious look, his frequent prayers, his love of solitude, his profound hypocrisy, and his deep plans. He caused himself to be received among the fakirs, wore their habit, and wished to visit the tomb of the great Prophet at Me-

dina. But in his twentieth year he laid aside the Koran, which he had hitherto carried in his bosom, raised a body of troops by his address and good fortune, and obtained the government of the Deccan. Here, wishing to give the fakirs a proof of his love and friendship, he invited them to a feast, and compelled them, notwithstanding their resistance, to put on new and decent clothing. He burned the old clothes, and found therein a quantity of gold and silver pieces, which did him good service when he came to carry on war with his brother. He stirred up dissensions between his brothers, made use of the assistance of one against the other, and finally shut his father up in his harem, where he kept him prisoner. He then murdered his relatives, one after the other, and in 1659 ascended the throne of Hindustan, and took the name of *Alemgir*. Notwithstanding the means by which he had got possession of power, he governed with much wisdom, consulted the welfare of his people, watched over the preservation of justice and the purity of manners, and sought to confirm his own power. Two of his sons, who endeavoured to form a party in their own favour, he caused to be arrested and put to death by slow poison. He carried on many wars, conquered Golconda and Bijapur, and drove out, by degrees, the Mahrattas from their country. He died in 1707. After his death the Mogul Empire declined, wars broke out between his sons, and several conquered provinces sought to make themselves independent.

AUREUS, or AUREUS NUMMUS, the first gold coin which was coined at Rome, 207 B.C., in the second Punic war. It weighed 2 denarii, and 1 quinarius, and was worth 25 denarii, or 100 sesterces. In later times it was called *solidus*, but had diminished in value. At first, 40 aurei were made out of a pound; under Nero, 45; under Constantine, 72. Its value varied at different times from about 12*s.* to £1, 4*s.*

AURICULAR CONFESSION. See CONFESSION.

AURIGA, in astronomy, the *Waggoner*, a constellation of the northern hemisphere containing sixty-six stars, according to the British catalogue.

AURORA (Greek, *Eōs*), in mythology, daughter of Hyperion and Theia, and sister of Helios and Selene. She was one of the ancient goddesses of the race of the Titans, but retained her rank among the latter race of gods. To the Titan Astræus, son of Crius, she bore the Winds, Zephyrus, Boreas, and Notus, the Morning-star, and the Constellations. She rises from the ocean, drawn by the celestial horses Lampus and Phaethon, and with rosy fingers raises the veil of night, shedding light upon the world, until she flies from the splendour of the day. Among the mortals whose beauty captivated the goddess poets mention Orion, Tithonus, and Cephalus.

AURORA AUSTRALIS. See AURORA BOREALIS.

AURORA BOREALIS (French, *aurore boréale;* German, *Nordlicht*), northern light. We often see in the N., near the horizon, usually a short time after sunset, a dark segment of a circle, surrounded by a brilliant arch of white or fiery light; and this arch is often separated into several concentric arches, leaving the dark segment visible between them. From these arches, and from the dark segment itself, in high latitudes, columns of light, of the most variegated and beautiful colours, shoot up towards the zenith, and sometimes masses like sheaves of light are scattered in all directions. The appearance is then splendid; and its increasing beauty is announced by a general undulation of the masses of light. A kind of fiery coronet is afterwards formed about the zenith, by the meeting of all the columns of light, resembling the knob of a tent. At this moment the spectacle is magnificent, both for the multiplicity and beauty of the columns which the aurora presents (compare Maupertuis, De la Figure de la Terre, Paris, 1738). The light after this grows fainter and more tranquil. This faintness and tranquillity, however, are only temporary, for the phenomena are soon repeated in all their beauty—the oscillations of the columns of light, the formation of the corona, and the like, though with a thousand variations. At length the motion wholly ceases, the light is collected about the northern horizon, the dark segment vanishes, and nothing is left but a strong brightness in the N., which gradually fades away. These brilliant appearances are also attended, in high latitudes, with loud noises, described as resembling the hissing and crackling of fireworks. This appearance has received the name of *northern light*, because, on account of our position on the earth, we see it chiefly in the N. A similar appearance, *aurora australis*, was seen in the S., in 1773, by Cook's sailors, between 58° and 60° S. lat., and later travellers have observed the same. These phenomena ought, therefore, properly to be called *polar lights*. Philosophers are of different opinions as to the cause of the aurora. It is, however, satisfactorily ascertained to be within the region of our atmosphere. Heli ascribed it to the reflection of the sun and moon by the clouds of snow and needles of ice, which are constantly floating in the atmosphere of the frigid zones. Mairan supposed it to proceed from the atmosphere of the sun. Bailly ascribed it to magnetism, and its remarkable influence on the needle has been generally observed. Franklin attributed it to electricity. Biot, who was sent to the Shetland Islands in 1817, by the French Academy of Sciences, to determine the length of the pendulum vibrating seconds, had an opportunity, Aug. 27 of the same year, of observing the aurora borealis in all its splendour at the island of Unst. Observations on this appearance were communicated by Richardson and Hood, in the appendix to Franklin's Narrative of a Journey to the Shores of the Polar Sea, in 1819, by Ross, Parry, and others. Other famous observations, made in Dec., 1829, by the Rev. James Farquharson, of Alford, Aberdeenshire, were published by the Royal Society of London in the Transactions for 1830. The general opinion nowadays is that the aurora is an electrical phenomenon; and there is manifestly an intimate connection between it and the magnetism of the earth, as the magnetic needle is always greatly disturbed during a brilliant display of the aurora. The many expeditions sent to the Arctic and Antarctic regions in recent times have given ample opportunities for observing the auroral phenomena in all their phases. Certain observers have asserted the existence of a hissing sound accompanying the display. See MAGNETISM (TERRESTRIAL), and EARTH CURRENTS.

AURUNGZEBE. See AURENGZEBE.

AUSCULTATION, derived from a Latin word signifying *to listen*, is applied in medicine to a method of diagnosis based upon a knowledge of the sounds produced by any organism performing its function, whether in a state of health or disease. It comprehends all the sounds perceptible at a distance, either by the ear applied immediately to the region which gives forth the sound, or by the intervention of instruments intended to transmit the sound. It ascertains the indications furnished by the sounds, whether naturally or artificially produced. The idea of exploring the chest by the ear is as ancient as Hippocrates, but the remarkable passage in which he refers to it remained unobserved. The merit of first practising auscultation methodically is due to Avenbrugger, a physician of Vienna, who in 1761, published a short Latin treatise on the subject. This treatise was translated into French by Corvisart, who accom-

panied it with a very copious commentary. The method of Avenbrugger and Corvisart consisted in producing sounds by striking the chest of the patient by the fingers, and determining the state of health or disease by the particular kind of sounds thus produced—a sound resembling that of a drum covered with cloth being considered healthy, and that which sounded as if solid flesh were struck indicating disease. It was therefore called the method of *percussion*; and though still used with advantage in particular cases, forms a very small part of auscultation, properly so called, which, though it did not originate with Laennec, is mainly indebted to his invention of the stethoscope for the important practical applications of which it has been found susceptible. He appears, however, to have overestimated the value of that instrument, and to have attached too little value to the immediate application of the ear, to which, in affections of the lungs and heart, physicians recur more frequently than to the stethoscope. Auscultation is employed not only in the affections now mentioned, but in cases of fracture, diseases of the larynx, vesicular calculi, pregnancy, &c. Attempts have recently been made to apply it to the phenomena of arterial circulation.

AUSONIUS, Decius Magnus, the most celebrated Roman poet of the fourth century A.D., was born at Burdigala (Bordeaux) about the year 310. He studied under several distinguished masters, and became at last professor of rhetoric in his native city, whence his fame extended through the whole empire. Valentinian intrusted to him the education of his son Gratian, and appointed him afterwards questor and pretorian prefect. After Gratian had ascended the throne he showed himself not less grateful to his preceptor. About the year 379 he appointed him consul in Gaul. After the death of Gratian, Ausonius lived upon an estate at Bordeaux, devoted to literary pursuits, and died about 392. As Valentinian was of the Christian religion, it is probable that Ausonius was so too; and many of his writings confirm this conjecture. Critics are not unanimous on the subject of his poetical merits. He is undeniably learned and ingenious, but his style and versification have the blemishes of the age, and his Latin is impure. His epigrams, idyls, eclogues, letters in verse, &c., are extant. The most valuable editions are: Bordeaux, 1575–80, two vols. 4to, by Souchay; Paris, 1730–34, Jaubert; Berlin, 1883, Schenkl.

AUSPICES. See Augur.

AUSTEN, Jane, a gifted novelist, was born Dec. 16, 1775, at Steventon, in the county of Hants, of which parish her father was rector. Upon his death his widow and two daughters retired to Southampton, and ultimately, in 1807, to Chawton. During her residence in the last-mentioned place Miss Austen composed the novels, which, for ease, nature, and a complete knowledge of the features which distinguish the domestic life of the English country gentry, are very highly esteemed. The principal of these productions are: Sense and Sensibility; Pride and Prejudice; Mansfield Park; and Emma. Two more were published after her death, entitled Northanger Abbey, and Persuasion, which were, however, her most early attempts. The object of Miss Austen in all her works was to advocate the superiority of sound principle, unsophisticated manners, and undesigning rectitude to showy and artificial pretensions. Her discrimination was acute, her humour easy and spontaneous, and her power of creating an interest in her characters, by slight and reiterated touches, extraordinary. This amiable and accomplished lady, whose personal and mental attractions were of a high order, died of consumption on the 18th of July, 1817, in her forty-second year.

AUSTERLITZ, a town with 3452 inhabitants, in the circle of Brünn, in Moravia, 10 miles E. of Brünn, on the highway which leads by Goding to Hungary, is famous for the battle of the 2nd of December, 1805, and the armistice of the 6th of the same month. These events were turning-points in the destiny of Europe and the elevation of Napoleon.

AUSTIN, St. See Augustine.

AUSTRALASIA, a division of the globe of somewhat indefinite limits, but usually regarded as comprehending the continental island of Australia and an unascertained number of other islands, some of them very little known, lying between lon. 110° and 180° E. and stretching from Papua or New Guinea, the farthest N. island of the division, to lat. 50° S. Besides the great island of Australia, it thus includes Tasmania, New Zealand, the Loyalty Islands (New Caledonia, &c.), Norfolk Island, New Hebrides, Solomon Islands, New Ireland (Neu-Mecklenburg), New Britain (Neu-Pommern), Admiralty Islands, and New Guinea, besides numerous other islands and island groups. The island of Timor and those lying W. of it, though coming within the general boundary above indicated, belong to the Eastern or Indian Archipelago, called also Malaysia. Australasia is estimated to have an area of 3,740,000 English square miles, and a population of 6,400,000. It forms one of three portions into which some geographers have divided Oceania, the other two being Malaysia and Polynesia, and corresponds with the Melanesia of other geographers, who have divided Oceania into Malaysia, or West Oceania; Micronesia, or North Oceania; Polynesia, or East Oceania; and Melanesia, or South Oceania.

AUSTRALIA (older name, New Holland), the largest island in the world, or rather a sea-girt continent, lying between the Indian and Pacific Oceans, S. of Asia, between lat. 10° 39′ and 39° 11′ S., and extending from lon. 113° 5′ to 153° 16′ E.; bounded N. by Torres Strait and the Arafura Sea, E. by the South Pacific, S. by Bass's Strait and the Indian Ocean, and W. by the Indian Ocean. Its greatest length, from W. to E., is 2400 miles; its greatest breadth, from N. to S., 1971 miles. Its area is calculated to be 2,946,691 square miles. It is divided into two unequal parts by the tropic of Capricorn, and has consequently both a temperate and a tropical climate.

Outline and General Structure.—Although there are numerous spacious harbours on the coasts of Australia there are few remarkable indentations; the principal are: the Gulf of Carpentaria on the N., and Spencer Gulf on the S.; the former extending inland 450 miles, with a breadth of 400; the latter extending 180 miles inland, and varying in breadth from 80 to 10 miles. A less marked indentation on the S. is the great Australian Bight. On the W. is Shark's Bay, and on the E. Hervey Bay, neither exceeding 40 to 50 miles in length or width. The form of Australia is unlike that of any other continent. The main watershed follows the coast around three sides, at a distance varying from 30 to 300 miles. Along the south the watershed directly fronts the sea for a distance of 700 miles, almost from Cape Leeuwin to the centre of the Great Australian Bight; there is then a gap of 600 or 700 miles, where the plains touch the sea, and the mountain barriers reappear in Victoria, forming a continuation of the eastern main range. From this mountain barrier the land slopes towards the interior of the continent, the lowest point being Lake Eyre, which is below sea-level. The interior of Australia may be described as being in the form of a basin tilted towards the southern margin between the meridians of 130° and 140° lon. E. It is this peculiar

AUSTRALIA
& NEW ZEALAND.
BY J. BARTHOLOMEW, F.R.G.S.
British Miles
50 0 100 200 300 400
Kilometres
50 0 100 200 300 400
Cables and Telegraphs
Railways
Note
British Possessions coloured
French . .
Portuguese . .
Dutch . .
German . .
Independent Islands .
INDIAN OCEAN
FLORES SEA
TIMOR SEA
ARAFURA SEA
Gulf of Carpentaria
Torres Str.
PAPUA NEW GUINEA
Celebes
Macassar
Salayer I.
Sumbawa
Sumba or Sandalwood I.
Timor
Paternoster Is.
Roma
Wetter
Timor Laut
Tenimber Is. or Timor Laut
Aroo Is.
Fred.k Henry I.
C. Valsche
Torres Str.
Endeavour Str.
Batavia R.
Duyfhen Pt.
Cape York Peninsula
Mitchell R.
Staaten R.
Van Diemen Gulf
Melville I.
Bathurst I.
Croker I.
Port Darwin
Coburg Penin.
Dundas Str.
Port Essington
Mount Norris B.
Goulburn Is.
Liverpool R.
Castlereagh B.
Wessel Is. & C.
English Company's Is.
Wilberforce
Melville B.
C. Arnhem
Arnhem B.
Caledon B.
Blue Mud B.
Groote Eylandt
Roper
Limmen Bight
Pellew Is.
Wallaby Is.
Sir Dixon Mts.
Nicholson R.
Gregory R.
Leichhardt R.
Flinders R.
Barkly Tableland
Burketown
Norman R.
Gilbert R.
Lynd R.
Mitchell R.
Staaten R.
Gregory Ra.
Herbert R.
Diamantina R.
Georgina R.
Cooper Cr.
Stokes Ra.
Barcoo R.
Thomson R.
Warrego R.
Darling R.
Murray R.
Murrumbidgee R.
Lachlan R.
Macquarie R.
Bogan R.
Castlereagh R.
Namoi R.
Gwydir R.
Peel R.
Hunter R.
Hawkesbury R.
Nepean R.
Shoalhaven R.
Clarence R.
Richmond R.
Tweed R.
Brisbane R.
Logan R.
Albert R.
Condamine R.
Balonne R.
Maranoa R.
Victoria R.
Roper R.
Daly Waters Sta.
Wyndham
Mt. Cockburn
Ord R.
Victoria R.
Fitzroy R.
Fortescue R.
Ashburton R.
Gascoyne R.
Murchison R.
Greenough R.
Moore R.
Arthur R.
Kent R.
Deep R.
Frankland R.
Hay R.
Shannon R.
Donnelly R.
Blackwood R.
Preston R.
Collie R.
Harvey R.
Murray R.
Serpentine R.
Canning R.
Swan R.
Helena R.
Avon

J. Bartholomew, Edin.

physical formation which causes the characteristic conditions of Australian climate and vegetation. The basin or table-land comprises about two-thirds of the area, the fringe of coast-land comprising one-third. The base of this table-land is granitic. Granite forms the axis of the Australian Alps, and the summits of a large proportion of the plateau on the east and west coasts are of the same rock. There are extensive tracts in which the granite is replaced by upheaved palæozoic strata, mostly in the form of shales and schists with an almost vertical dip. Above the older palæozoic rocks and granite are certain basins of Carboniferous rocks. Over the coal-measures on the edge of the table-land all round there occurs a horizontal sandstone with oblique laminations. The great central basin is of Cretaceous age. The highest portions of the edge of the plateau, and, therefore, the sources of all the rivers, are in recent volcanic emanations.

Mountains.—The geographical centre of the whole mountain system of eastern Australia lies in the south-east of New South Wales, close to the confines of Victoria. Here some of the peaks rise to a height of over 7000 feet above the sea. Mount Kosciusko and Mount Townsend, two of the highest peaks of the system known as the Australian Alps, attain an elevation of 7328 and 7260 feet respectively. The central plateau which these heights dominate is continued to the westward through Victoria. The main range under various names extends across this colony, its principal summits being Mount Hotham, 6100 feet; Bogong, 6508; the Pilot, 6020; and Cobberas, 6025, all in the Dividing Range; Mount Howitt, 5715 feet, in the Barkly Ranges; and Mount William, 3827, in the Grampians. The northern extension of the watershed follows the Pacific Ocean at a distance of from twenty to a hundred miles, presenting the character of an unbroken chain northward to the 27th parallel, and forming the division between the streams which fall into the Pacific and the inland waters. The average height of the watershed here is 2000 feet. Nowhere do the mountains rise in proportion to the height of the table-land. Mount Kosciusko, the highest peak, as already mentioned, has its summit reaching the elevation of 7328 feet above the sea, but the adjacent plateau averages 4000 feet. West of Sydney the dividing range is called the Blue Mountains, but there are no specially prominent peaks; further north it is known as the Liverpool Range, which runs into the New England Range, and the table-land broadens and rises to an average height of 3000 feet. Here several conspicuous mountains appear, of which Ben Lomond (5000 feet) and Mount Sea View (6000) are the highest. North of the 27th parallel the watershed recedes from the coast, its mountain character being also greatly modified, as the average height does not exceed 900 feet above the sea. Through Queensland the range runs irregularly in a north-west direction, in some places well marked by a defined ridge, and in others almost undistinguishable. About lat. 20° the watershed turns westward; there are, however, farther north, high rugged chains, but these have no connection with the main range. The Bellenden-Kerr is the principal of these chains; its principal peaks are Wooroonooran (5400 feet) and Choorechillum (5200 feet). After turning west the dividing range continues to run more or less parallel with the coast, at a distance therefrom of from two hundred to three hundred miles, but the level is very much lower than on the eastern side, the watershed at the Gulf of Carpentaria being only a barely perceptible rise in a plain whose general elevation is about 1000 feet above the sea. On the west coast, south of the Tropic of Capricorn, the coast tract narrows greatly, and at the Murchison river it is only a few miles broad. Rounding Cape Leeuwin, the south-west point of the continent, the range turns eastward, and finally runs out at the Russell Range, near the western end of the Australian Bight. There the table-land comes right down to the margin of the sea, and for a distance of 600 miles along the coast the cliffs so overhang the shore as to leave absolutely no coastal strip. The other mountains of Australia are few, and inconsiderable in height. The Barrier Ranges, in which are the Broken Hill silver mines, are in New South Wales, west of the River Darling; their greatest elevation is 1400 feet above the surrounding country, which is 600 feet above the sea. The Flinders Range runs north from the head of Spencer Gulf, and attains a height of 3000 feet; to the south it extends as far as Cape Jervis, along the margin of the Gulf of St. Vincent, and is called the Mount Lofty Range. In Eyre's Peninsula is the Gawler Range, whose elevation does not exceed 2000 feet. Both the Flinders Range and the Gawler run from the coast to the interior, and after extending over some 300 miles of country, end somewhat abruptly among the salt lakes of which Lake Eyre is the centre. Apart from all other mountain systems, and near the centre of the continent, rise the MacDonnell Ranges, 4000 feet in height; they lie across the Tropic, and extend over three degrees of longitude.

Rivers and Lakes.—A scarcity of fresh water, whether in the form of rivers or lakes, is one of the prevailing characteristics of Australia. Upon the coast margin the rivers are numerous, but owing to the nearness of the watershed to the sea most of them have short courses. On the east are the Normandy, the Herbert, the Burdekin, and the Fitzroy in Queensland; and in New South Wales the Richmond, Clarence, Mackay, Hunter, Hawkesbury, and Shoalhaven, as well as others of less note, all falling into the Pacific. On the north several important rivers flow into the Gulf of Carpentaria; amongst these are the Mitchell, Gilbert, Norman, Flinders, Leichhardt, Gregory, and Roper. Several large and navigable rivers reach the sea west of the Gulf of Carpentaria; the more important are the Daly and Victoria, in the Northern Territory. On the north-west coast are the Ord and another Fitzroy, both considerable rivers; and on the west coast are the De Grey, Fortescue, Ashburton, Gascoign, and Murchison, with a few small streams. Except the Murray, which does not belong to the coastal system, no important river reaches the sea at the southern coast of the continent, and on the shores of the Great Bight for 300 miles there is not a channel of any kind in which water runs. There are two great inland systems of rivers, both within the eastern portion of the great basin of the interior. The system of the Murray river is first in importance. This river enters the sea at Lake Alexandrina, not far south of Adelaide, and with its various affluents drains a territory 980 miles long by 520 miles broad. The chief tributaries of the Murray are the Darling and Murrumbidgee, both from the north; the streams joining on the left bank are of no great importance. The farthest source of the Darling is in Queensland, namely, the Warrego, which rises very close to the intersection of the 25° south latitude and the 147° meridian; besides the Warrego, its principal affluents are the Condamine, Maranoa, Gwydir, Namoi, Bogan, Castlereagh, and Macquarie. The Murrumbidgee receives the Lachlan about fifty miles above its junction with the Murray. Judged by their length these are all considerable rivers, but their volume is not large except in times of freshets. The second river system is that of Lake Eyre, comprising all

the channels which lead southward from the northern watershed, and west from the Darling. The principal rivers are the Barcoo or Cooper, Thompson, Diamantina, and Herbert from the north-east; and the Macumba, Finke, and Alberga from the north-west. This system differs from the others, inasmuch as its waters do not reach the sea, being absorbed in the saline swamps of the Lake Eyre district. At certain seasons of the year an immense body of water flows down the channels leading to this lake, and the drainage of about 600,000 square miles disappears mysteriously, leaving only the muddy shores and reed beds of the lakes to mark the sink into which it had been poured. The western half of the interior shows no river system whatever, for at the crest of the table-land the desert indications begin. The fall inland is so gradual, that for large distances the ground is apparently a dead level, and the porous surface absorbs the rain as it falls. Here and there, however, some of the rain collects in salt lakes or mud flats. The so-called lakes appearing on the maps of Australia are for the most part shallow pans, which only occasionally contain water.

Climate.—The climate of Australia is, with some exceptions, extremely healthy. The Tropic of Capricorn divides Australia into two parts; of these the northern or intertropical portion contains 1,145,000 square miles, comprising half of Queensland, the northern territory of Southern Australia, and the north-western divisions of Western Australia. The whole of New South Wales, Victoria, South Australia proper, half of Queensland, and more than half of Western Australia, comprising 1,800,000 square miles, are without the tropics. In a region so extensive there are naturally very great varieties of climate, but as a whole the climate of Australia is milder than corresponding lands in the northern hemisphere. During July, which is the coldest month, one half of the continent has a mean temperature of from 40° to 60° (Fahr.), and the other half from 64° to 80°. The temperature during December ranges from 50° to above 95° (Fahr.), half of Australia having a mean temperature below 83°, and about one-fourth below 70°. The climate may be considered as generally very dry. Over 1,200,000 square miles the rainfall is less than 10 inches in the year, and the average for 840,000 square miles is from 10 to 20 inches. A belt of country 250 miles wide, extending along the coast from the north-west corner of the continent at 15° S. to the Pacific coast at latitude 32°, and narrowing to about 80 miles wide along the remainder of the Pacific shores, has a rainfall in excess of 20 inches, and the portion of this belt lying within about 75 miles of the sea has an average of over 30 inches. The greatest rainfall is experienced along the east coast of Cape York Peninsula, where it ranges from 60 to 70 inches.

Mineralogy.—Australia is a region containing a vast quantity of mineral wealth. Besides its rich and extensive deposits of gold, which were first discovered in 1851, and have furnished so much of this precious metal to the commerce of the world, it possesses silver, copper, tin, iron, lead, zinc, antimony, plumbago, diamonds, opals, &c., besides coal, in abundance. The richest gold districts are in Western Australia, Victoria, and Queensland; but New South Wales also produces a fair quantity. Silver (from lead) is now being obtained in large quantities from the Barrier Range districts of New South Wales. Almost inexhaustible supplies of tin exist in Queensland. Copper is the chief mineral product of South Australia, it is also abundant in New South Wales. The coal seams of New South Wales are of great extent, and have been successfully worked for many years. Beautiful marbles, suitable for statuary and other ornamental purposes, have also been found in many parts of Australia. The value of the gold produced in Australia to the middle of 1910 was £520,000,000, and the present production of all minerals exceeds £20,000,000 per annum.

Vegetation.—An estimate of the number of the indigenous Australian plants was made by the late Baron von Müller, the government botanist at Melbourne, who considered that there will not be found above 10,000 species in all. About six out of every seven of its species are peculiar to Australia. The foliage being evergreen, the forests and woodlands do not exhibit either the varied tints of autumn or the soft freshness of spring to which European eyes are accustomed. The forests are of two kinds, the open forests and the 'brush'; the latter kind are difficult to penetrate, owing to the scrubby underwood with which they are choked up. Besides the forests properly so called there are 'scrubs', which take their name from the plant of which they are mainly composed. Thus there is the 'mallee' scrub, consisting of a dense growth of a dwarf species of eucalyptus, somewhat resembling a bushy willow or osier. In South Australia a scrub of this kind extends over a continuous area of about 9000 square miles. Another variety of scrub is the 'mulga' scrub, consisting chiefly of spiny acacia bushes, through which, when growing closely, it is often impossible to force a path. The tracts called 'heaths' are covered with shrubs of lower growth, presenting in the flowering season an expanse of varied and beautiful blossom. The most characteristic forest trees are the various species of eucalyptus or gum-tree, of which there are over 160 species, many of them of great value for their timber, such as the iron-bark, tallow-wood, red-gum, stringy-bark, turpentine, karri, and jarrah. Among the gum-trees have been found the giants of the vegetable kingdom—measuring from 400 to 480 feet in height. Acacias, here called 'wattles', are extremely common, nearly three hundred kinds having been found, all possessing a family resemblance. Some of them are of considerable value, yielding excellent bark for tanning. The most beautiful and useful is perhaps the golden wattle (*A. dealbata*), which in spring is adorned with rich masses of fragrant yellow blossom. Palms—of which there are about twenty-four species, all except the cocoa-nut peculiar to Australia—are chiefly confined to the northern and eastern coast regions. The Proteas and Banksias are almost peculiar to Australia. Beautiful tree-ferns are found in some localities, growing to the height of 15 or 30 feet, and then suddenly spreading out their enormous leaves, each 4 or 5 feet in length, in every direction. The she-oak (*Casuarina*) comprises remarkable leafless trees of several species. Certain plants of the lily family constitute a marked feature of Australian vegetation. Among them are the *Xanthorrhœas* or grass-trees, with shrubby stems somewhat resembling small palms, bearing tufts of long wiry foliage at their extremities, from the midst of which rise very long cylindrical spikes of densely-compacted flowers like bulrushes. Beautiful flowers and aromatic plants are a feature of Australia. In the more favoured regions grasses are abundant and nutritious, presenting pasturages of great extent, and admirably adapted for the rearing of live stock. The spinifex or porcupine grass, however, which covers large areas in the arid regions of South and West Australia, has a very different character, being a hard, coarse, and excessively spiny plant which wounds the feet of horses and renders travelling difficult, and is rejected as food by all animals. The native fruit-trees are few and unimportant, and

Australians: 1, North Australian. 2, South Australian. 3, West Australian. 4, Tasmanian. Melanesia of Fiji. 12, 13, Woman and Man of the Hermit Islands. Micronesians: 14, Yap Islander. 15, Islander. 21, Woman of Marshall Islands. Polynesians: 22, Tonga Islander. 23, Hervey Islander or Low Archipelago. 29, 30, Man and Woman of Samoa.

ve of New Britain. 6, New Caledonian. 7, Solomon Islander. 8, New Hebridean. 9, Papuan. 10, 11, Man and Woman Mortlock Islands. 16, Gilbert Islander. 17, 18, Woman and Man of Pelew Islands. 19, Caroline Islander. 20, Rook Zealander. 25, Woman of the Marquesas. 26, 27, Woman and Man of the Society Islands. 28, Woman of Tuamotu

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the same may be said of the plants yielding edible roots; but exotic fruits and vegetables are now grown in great abundance, and of excellent quality. The cultivated fruits comprise almost all those of the tropics, as well as those of colder climates, and include the peach, nectarine, apricot, apple, orange, lemon, fig, banana, guava, pine-apple, &c. The vine, the olive, and mulberry also thrive well, and considerable quantities of wine are made in some localities. All the cereals of commercial value are extensively cultivated, and considerable areas, particularly in Queensland and New South Wales, are under the sugar-cane. Tobacco of good quality is grown.

Zoology.—Mammals are represented in Australia by the Monotremes, the Marsupials, a dog, many rats and bats, as well as by the marine aquatic animals—whales, seals, and the dugong. There are more than 110 species of marsupials, and the only family represented outside Australasia are the opossums. The largest marsupial, as well as the largest native quadruped, is the kangaroo. There are many species of this singular animal, some of them very small but beautifully furred. The largest are locally distinguished by the names of the *forester* and the *old man*. Other marsupials are the wombat, marsupial mole, bandicoot, native cat, phalangers or opossums similar to those of America, the flying-mouse, flying-squirrel, &c. There are large bats known as flying-foxes. Wild dogs (dingos) are frequently met with. They are wolfish in appearance, with ears erect, colour a reddish brown. They do not bark, but sometimes yelp like the common dog. When hard pressed by hunger they devour each other, and being very destructive to sheep they are destroyed by the settlers whenever an opportunity occurs. One of the most remarkable animals is the ornithorhynchus (duck-billed platypus or duck-mole), an aquatic mammal frequenting rivers and lakes and their margins, with the beak of a duck and a fur-covered body, in shape resembling that of an otter. A hardly less remarkable animal is the echidna or porcupine ant-eater. The young of both are produced from eggs. Australia now possesses a large stock of the domestic animals of Britain, which thrive there remarkably well. The breeds of horses, cattle, sheep, and swine are excellent. Rabbits have been introduced, and have multiplied so as to become a perfect pest. The total number of species of mammalia found in Australia is about 160.

The birds of Australia are numerous and in great variety, all the more important orders and families of class Aves being represented. Eagles, some very large, measuring about nine feet from wing to wing; falcons, and various species of hawks and owls, are numerous; and so also are parrots and cockatoos, many of them of the most beautiful plumage. Pigeons of various species, and the most delicate and varied hues, frequent sundry parts of the island. Vultures are entirely wanting. The more familiar kinds of singing birds are also absent, though some have been introduced from Europe. The largest Australian bird is the emu, which, though excelled in size by the ostrich, attains a height sometimes of more than 7 feet, 5 and 6 being the average. It is widely diffused, but is rapidly disappearing from the more settled districts. The lyre-bird with its magnificent lyre-shaped tail, the interesting bower-birds, and the mound-building talegalla and megapodius, are natives of this land of extraordinary natural productions. Quails supply the place of partridges to the sportsmen. The gigantic jabiru stork may be seen on the borders of the rivers, lakes, or swamps, which also abound in the duck tribe. Other aquatic birds are the pelican, Australian goose, and that *rara avis* of the Latin writers, the black swan—a bird of the most stately form and graceful carriage, to be seen in great numbers on the lagoons and other waters. The number of species is about 650.

The reptiles of Australia are pretty numerous. The most formidable is the crocodile, which is found in the north. Of serpents there are upwards of sixty different species, and, though not generally of a large size, some of them are extremely venomous in character. Those most commonly seen in New South Wales are the diamond snake, the black, gray, and brown, the whip, the tiger, the copper-headed snake, and the death adder. In the N. parts of Australia they are more numerous, of greater variety, and of larger size. Lizards and frogs are also numerous in various parts.

The seas, rivers, and lagoons abound in fish of numerous varieties, and other aquatic animals, many of them peculiar. Bream, nearly as large as the sea-fish of the same name, are plentiful in the harbours and estuaries; and in the lagoons are caught enormous eels, some of them weighing 20 lbs. So-called cod are abundant in the Murray river and its tributaries; they grow to a large size, being not unfrequently caught of the weight of 50, 60, and even 90 lbs. Whales and seals frequent the coasts. On the north are extensive fisheries of trepang, much visited by native traders from the Indian Archipelago.

Aborigines.—The indigenous race resembles no other people in the Southern seas, but have many points showing kinship to the hill tribes of Hindustan. They are of a dark brown or black colour, with jet-black silky curly hair, and of medium size, slight but athletic, with deep-set eyes, low receding foreheads, wide curved nostrils, and large mouths. The women are not nearly so well developed as the men. Of the number of the aborigines little is positively known, but the last census enumerated nearly 50,000 in New South Wales, South Australia, and Western Australia, and probably these comprised not more than one-fifth of the whole number. In the settled districts they are few and inoffensive, and rapidly dying out. They have no fixed habitations; in the summer they live almost entirely in the open air, and in the more inclement weather they erect shelters of the rudest kind. Their religious condition is very low; and, it is believed, they occasionally resort to cannibalism. They are employed by the settlers in light kinds of work; but they dislike continuous occupation. The weapons of all the tribes are similar, consisting of spears, shields, boomerangs, waddies or clubs, and stone hatchets.

States.—The states or colonies in Australia are New South Wales, Victoria, South Australia, Western Australia, and Queensland (see separate articles). Their area and population are as follows:—

	Area, sq. miles.		Pop. in 1901.
New South Wales.....	310,700	....	1,359,943
Victoria.....	87,884	....	1,195,874
Queensland.....	668,497	....	502,392
S. Australia.....	903,425	....	362,604
W. Australia.....	975,920	....	182,553
	2,946,426	....	3,603,866
Tasmania.....	26,215	....	172,475

Estimated pop. Dec. 31, 1909, 4,374,138.

Till recently each was an independent colony. A movement in favour of federation grew up, however, and in 1900 the Australian Commonwealth was established by an act of the British Parliament. The states included in it comprise Tasmania as well as the Australian colonies proper. A site for a federal capital was set aside in 1909 in N. S. Wales, 150 miles south-west of Sydney. The Commonwealth has now a

governor-general and a central or federal parliament, consisting of a Senate and a House of Representatives, while each state has also (as before) a governor, an administration, and a parliament of its own. Each parliament consists of two houses, corresponding to the British House of Lords and House of Commons, the lower house being elected by manhood suffrage. The aggregate annual revenue of the states is about £40,000,000, the total publicdebt about £250,000,000. The Commonwealth has a small permanent defensive force besides militia and volunteers, also cruisers, gun-boats torpedo-boats, &c. There is no established church. Education is well provided for, and is secular and compulsory. Pastoral and agricultural pursuits and mining are the chief occupations, but there are important manufactories in Melbourne and Sydney and in several other cities. The great bulk of the trade is with Great Britain and the British possessions. The principal exports are wool, gold, silver and silver-lead ore, copper, tin, zinc, wheat, frozen and chilled meat, preserved meat, tallow, hides and skins, timber, butter, fruit, &c. The aggregate oversea imports in 1909 amounted to about £51,000,000, the exports to £65,500,000. The total length of railways open is fully 15,000 miles.

Discovery and History.—It is impossible to say who were the first discoverers of Australia, although there is evidence that the Chinese had some knowledge of the continent as far back as the thirteenth century. There is in existence a map dedicated to Henry VIII. of England on which a large southern land is shown, and the tradition of a Terra Australis appears to have been current for a long period before it enters into authentic history. The Portuguese advance claims to be the first European discoverers, but so far the evidence in their favour is not conclusive In 1606 Torres, a Spaniard, passed through the strait that now bears his name. Between this period and 1628 a large portion of the coast-line of Australia had been surveyed by various Dutch navigators, and from them came the name New Holland. Between 1684 and 1690 Dampier explored a part of the W. and N.W. coasts, to which discovery had hitherto been confined; but in 1770 Cook extended it to the E. coast, which he carefully surveyed, landing at, and giving name to, Botany Bay. The name New South Wales comes also from him. In 1787 it was determined to found a British colony in New South Wales, and the first expedition set sail. It comprised a frigate and an armed tender, three store-ships and six transports, and carried 564 men and 192 women who had been sentenced to expatriation, 178 marines, 5 medical men, a few mechanics, and 40 women, wives of marines. The place selected as the site of the colony was Port Jackson. The first governor of the settlement was Captain Phillip, the commander of the expedition. Captain Phillip was followed by a series of governors, among whom are the known names of Bligh, Macquarie, Darling, Bourke, Gipps, &c. In 1851 the great gold discoveries took place in the Port Phillip district, which was then erected into a separate colony, under the name of Victoria. Victoria had received its first colonists from Tasmania in 1834. The gold discovery made an epoch in the history of Australia, and had important effects, indeed, upon the whole civilized world. Previous to this time the colonies both of Western Australia and of South Australia had been founded—the former in 1829, the latter in 1836. Western Australia remained a penal settlement until 1868, or for nearly thirty years after transportation to New South Wales was abolished. Its condition long remained unpromising, but the discoveries of gold have greatly bettered the circumstances of the colony. The first colonists to South Australia were sent out under the auspices of a company. Prosperity began with the discovery in 1843–45 of rich copper deposits. The next colony to be established was Queensland, which took a separate existence in 1859, being previously part of New South Wales. The overland telegraph from Adelaide to Port Darwin was completed in 1872. Western Australia was granted responsible government in 1890, the others in 1855–59. Australia suffered from a great bank crisis in 1893, and from a great drought ending in 1902. Since then there has been increased prosperity, and immigration, after it had greatly diminished, is now again encouraged.

Exploration.—For twenty-five years after the establishment of a colony on the shores of Port Jackson, settlement was confined to the narrow strip of country shut in on the north-west and south by the Blue Mountains, beyond which no one had penetrated, though many attempts to do so had been made. Along the sea the colony extended from Jervis Bay to Port Stephens, a distance of 165 miles. In 1813 the mountain barrier was successfully crossed by Messrs. Blaxland, Lawson, and Wentworth, and the plains beyond were at once occupied. In 1815 a practicable road was made across the mountains, and exploration was thereafter pushed on with the greatest vigour. In 1817 Oxley discovered and traced the Lachlan for some hundred miles, and later he discovered the Macquarie and other streams. In 1819 the Murrumbidgee was discovered. In 1824 Messrs. Hovell and Hume crossed the district now forming the colony of Victoria and reached the head of Port Phillip. Allan Cunningham the botanist made extensive explorations in 1823 and subsequent years, and the celebrated Captain Sturt commenced his arduous and wonderful undertakings about the same time, nor should the names of Hume and George Macleay be forgotten. Major Mitchell continued the work, joining skill and science to much energy and good fortune. Meanwhile the survey of the coast begun by Flinders was ably continued by Captain Parker King and others. The north-west coasts were next examined by explorers, but with little result. From Sydney the centre of exploration was moved to Adelaide, and from that city several famous expeditions set out. It was from Adelaide that Eyre started on most of his journeys, and from there also Captain Sturt began his survey of the lower Murray and Darling in 1844. Much exploration was done in Queensland about this time by Dr. Leichhardt under the auspices of the government of New South Wales. Leichhardt lost his life in 1848 in an attempt to cross the continent to the west coast. Very extensive discoveries were made by Messrs. A. C. and F. T. Gregory in the fifties, and in 1862 John M'Douall Stuart, after several gallant attempts, crossed the continent from Adelaide to the northern coast and returned to the point of starting. In 1860–61 a well-equipped expedition left Melbourne to cross the continent, under the command of R. O'Hara Burke and W. J. Wills. The disastrous end of the expedition is well known. Several relief expeditions were fitted out to find traces of the Burke and Wills party, and it fell to Mr. A. W. Hewitt to discover the sole survivor King, who had been preserved from starvation by the kindly aid of the natives. Australia has never wanted for explorers, and from 1860 onward, a year has scarcely passed that an expedition of some kind has not been at work. The catalogue of the names of explorers is a long one. To the names already mentioned may be added Sir John Forrest, Major Warburton, Landsborough, J. M'Kinlay, Alex. Forrest, E. Giles, Hodgkinson, the Jardine Brothers, Lewis, Lindsay, Carnegie, &c.

AUSTRALIA, South, a British colony, so named as being originally established on the south coast of Australia. At first the colony of South Australia extended between lon. 132° and 141° E., and from the Southern Ocean to lat. 26° N., and it then had an area of about 300,000 square miles. In 1861 a district lying to the W. of the colony was added to it, so that its western boundary was shifted to the meridian of 129°. In 1863 it received in addition the country between its northern boundary and the opposite coast (the Northern Territory), thus giving it a territory extending across Australia, with an area of 903,425 square miles; but the Northern Territory was transferred to the Commonwealth on Jan. 2, 1911, leaving to the colony for the future an area of about 380,000 square miles. On the E. it is bounded by Victoria, New South Wales, and Queensland; on the W. by Western Australia. The southern coast, for the first 120 miles eastwards of where it begins at Port Eucla, has the shore backed by steep limestone ranges from 400 to 600 feet in height, but as a whole the coast is low and desolate-looking. In a straight line from Port Eucla on the west to Cape Northumberland, near the boundary of Victoria, the distance is 850 miles, but the coast-line between these points extends to nearly twice that distance owing to the depth to which Spencer Gulf and the Gulf of St. Vincent penetrate. Opposite the Gulf of St. Vincent is Kangaroo Island, the largest island on the Australian coast, excepting of course Tasmania. The coast of the Northern Territory is thickly strewn with islands, two of which are of some size. There are also several excellent ports, one of these, Port Darwin, where the overland telegraph from Adelaide and the cable from Batavia and the East meet, being among the finest harbours in Australia. On the east side of the Gulf of St. Vincent lie the most populous portions of the colony, and here is situated Adelaide, the rising colonial capital. The interior formation of South Australia is very different from that of the more eastern colonies. The mountains here run from the sea to the interior, ending somewhat abruptly among the lakes. The principal chain, the Mount Lofty Range, begins at Cape Jervis, and follows the shore of the Gulf of St. Vincent past Adelaide, meeting at the head of the gulf the ridges forming the backbone of Yorke Peninsula. The range still running north is called Flinders Range, and ends in a wide mass of mountain 3000 feet high, separating the lakes Torrens, Eyre, Frome, and Blanche. All these so-called lakes are huge expanses of salt water, swamp, and mud. On the west of Spencer's Gulf is Eyre's Peninsula, through the heart of which runs the Gawler Range, which attains an elevation of 2000 feet, and has on its northern side a series of lakes of the same character as Lake Torrens. The principal summits of the Mount Lofty Range are Razor-back, in lat. 33° 20′, and immediately north of it Mount Bryan, close to which is the celebrated Burra-Burra copper mine. The highest peaks of the Flinders Range are Mount Remarkable, 3179 feet, Brown 3174 feet, and Arden 3000 feet. None of the peaks in the Gawler Range attain more than a moderate elevation. On the left bank of the Murray, and near its mouth, a range of moderately elevated heights proceeds S.S.E., skirting the coast to its extremity near Cape Northumberland. Throughout these ranges the existence of volcanic agency at a former period is everywhere apparent. The Warburton Range and the Stuart Ranges lie beyond and to the north and west of the lakes; farther north, on the tropic of Capricorn, are the MacDonnell Ranges, rising to a height of 4000 feet, from which the most westerly affluents of the Lake Eyre river system take their rise. The other portions of the territory to the north and west are almost level, and consist of either waterless plains or plains of sandstone boulders, with desert grass and spinifex. Among the mountains E. of Gulf St. Vincent primitive limestone, often in the form of a beautiful white marble, is very abundant. There are indications of a large variety of minerals throughout the province, but copper is the only one that has been met with in large quantities, the total production to the end of 1909 being valued at £28,000,000. Gold has been found in various places, but the quantity won has been small. In the Northern Territory gold has also been found over a considerable tract of country, and good progress has been made in mining, while other minerals are known to exist. Almost the only stream within the colony proper, which deserves the name of river, is the Murray, which enters the colony on the E., in lat. 34°, flows first circuitously W., and then S. into the extensive lagoon called Lake Alexandrina, communicating with the sea by a narrow opening. During the rainy season it is navigable by steamers through its whole course within the colony, and for 1500 miles in New South Wales. In the Northern Territory the river Roper is a fine large stream, navigable for sea-going vessels for a hundred miles from its mouth in the Gulf of Carpentaria; the Victoria is also navigable. The climate of South Australia proper greatly resembles that of Sicily and Naples. During nine months of the year it is agreeable, the disagreeable portion of the year being the three summer months of December, January, and February, when the natural heat of the season is greatly increased by hot winds from the interior. What is called winter would be considered in England merely a wet autumn. There are no epidemic diseases. Scrofulous and tubercular diseases are rare, but diseases of the eyes are common in summer, being either occasioned by the impalpable dust floating in the atmosphere, or by exposure to the night air after the glare of the sun. South Australia produces nearly all the fruits and vegetables that are cultivated in England as well as others, but it is chiefly distinguished as a wheat and grape growing country. Besides supplying its own wants, it sends large quantities of wheat to the neighbouring colonies and to England, where 'Adelaide' wheat is held in high estimation. The area under wheat now amounts to more than two million acres. The quantity produced varies greatly with the season, but the average production is 8 bushels per acre. The area under vineyards is gradually extending, and now approaches 20,000 acres. Brandy is produced as well as wine. Hop-growing is attracting some attention, and the olive is also cultivated. The annual value of the exports is about £13,000,000, and of the imports £11,000,000, total £24,000,000. The chief exports are wool, wheat, flour, copper and copper ore, &c. The value of the wool exported is generally about £1,500,000, that of wheat and flour much the same. The trade of part of New South Wales passes through South Australia. The value of the imports from the United Kingdom is about £3,000,000, chiefly manufactured goods; that of the exports is greater. The revenue and expenditure are each about £3,500,000. The length of railways is 1890 miles. There is a complete system of telegraphs, besides the great line from Adelaide across the continent to Port Darwin, a distance of 2000 miles. The public debt of the colony is £30,000,000, and has been mostly incurred for reproductive public works. South Australia has a Parliament consisting of a legislative council and a house of assembly. The former is composed of twenty-four members elected

by four electoral districts (six by each). Eight of the members retire every three years, their successors being then elected, two from each of the four districts. The house of assembly consists of fifty-four members elected for three years by twenty-seven districts, and is liable to be dissolved by the executive. The executive is vested in a governor appointed by the crown and a responsible executive council, the members of which must be members of either of the two houses of Parliament. For the foundation of the colony see preceding article. The pop. in 1861 was 126,830; in 1871, 185,626; in 1881, 279,865; in 1891, 320,431; in 1901, 362,604.

AUSTRALIA, WESTERN, a colony which embraces all that portion of Australia west of lon. 129° E., bounded east by South Australia, and north, west, and south by the Indian Ocean, lying between the parallels of 13° 30′ and 35° 8′ S.; greatest length, 1450 miles north to south; greatest breadth, 850 miles east to west; area, 975,920 square miles. The coast-line measures about 3000 miles, and, except on the south, is indented by numerous bays, creeks, and estuaries. The coast is fringed by many islands, but none is of any importance. The principal inlets are Cambridge Gulf, Admiralty Gulf, York Sound, Collier Bay, King Sound, Roebuck Bay, Exmouth Gulf, Shark's Bay, Geographe Bay, and King George's Sound, the last the most important as having Albany on its shore, the port of call for the European mail steamers. The chief rivers are the Ord and Fitzroy on the north, De Grey, Ashburton, Fortescue, Gascoign, Murchison, Greenough, Swan, and Blackwood on the west. The Swan River is important, as Perth, the capital, is situated on its banks. Some of the rivers within the tropics are large and navigable, but few of the others run all the year, and fewer still are navigable even for boats to any great distance. The interior was until recent years not well known, but at present there is little territory which has not been explored. The country is mostly an alternation of ridges and hollows, sandy, without grass, and clothed with bushes and scrubby timber, without the trace of a water-course. The really settled and occupied portion of the colony forms only a mere fraction of its whole area. The population is mostly aggregated in the south-western corner, where the first settlements were made, and around the recently discovered gold reefs. Scattered settlements stud the coast at various points. On the west coast are extensive banks covered with the pearl-oyster, which give employment to a fleet of boats. The Kimberley district in the north is a region of great promise; it comprises 20,000,000 acres of well-watered land intersected by the river Fitzroy and other large streams, and is said to be admirably adapted for pastoral purposes, besides having a large area suitable for the cultivation of sugar, coffee, and rice. The greater part of the sea-board, except along the Australian Bight, is separated from the interior by a low range of hills running parallel to it, and covered with forests. The fertile land exists in patches, and some of it is of a very rich character. The principal crops are wheat, barley, hay, and potatoes; the vine is also successfully cultivated, and excellent wine is made in the colony. The area under cultivation has rapidly increased during recent years, the rise being from 283,752 acres in 1904 to 586,489 in 1909. The live stock in 1909 numbered 4,730,000 sheep, 793,000 cattle, 125,000 horses, besides a large number of camels, pigs, goats, and poultry. An available area of 1000 square miles is covered with jarrah forests. The jarrah is a species of Eucalyptus (*E. marginata*); its timber is in great request for railway sleepers, for building purposes, and especially for marine constructions, having the valuable property of resisting the attacks of the white-ant on land and the ship-worm at sea. Considerable areas in the south-west are covered with karri (*E. diversicolor*). There are also numerous forests of sandal-wood trees, the timber of which is exported in large quantities, chiefly to China for incense purposes. Flowers and fruits from all quarters of the globe grow luxuriantly. Among the fruits successfully cultivated are apples, pears, oranges, peaches, plums, apricots, figs, almonds, bananas, olives, &c. English vegetables may be profitably cultivated at almost all seasons. Bees thrive and produce abundant stores of honey. The mineral resources of the colony are not yet fully known. Gold has been discovered in large quantities, and Western Australia is now the chief gold-producing colony of Australia, the Coolgardie gold-fields being among the most productive. In 1903 the gold produced had the value of £8,770,719. Lead and copper exist abundantly, and several mines are in operation. Iron ore might be raised in almost inexhaustible quantities, and tin also exists. The gold discoveries have formed an epoch in the history of the colony, and trade and population have recently increased very rapidly. The imports, which in 1887 were valued at £830,000, amounted in 1909 to £6,407,000, the exports in the latter year being £8,860,500. Besides gold the exports include wool, jarrah and karri timber, sandal-wood, pearls, pearl shells, tin ore, skins, &c. The revenue has grown enormously. In 1881 it was £206,205; in 1891, £497,670; and in 1909, £4,274,000. The public debt is £23,287,000, equal to about £85 per inhabitant. There are about 2100 miles of railway open. The principal towns are Perth, the capital, with a population now estimated at 38,000; and Fremantle, which is the chief port.—The first part of the colony settled was the south-west corner, long known as Swan River Settlement, established in 1829. From 1850 to 1868 it was a place for the transportation of convicts. In 1890 the colony received a system of responsible government similar to that prevailing in the other colonies of Australia. In 1850 the population was only 5293; in 1860, 15,227; in 1870, 25,084; in 1880, 29,019; in 1890, 46,290; in 1901, 182,553; in 1910, 282,856.

AUSTRIA (in German, *Oesterreich*, that is, Eastern Empire), an extensive monarchy in Central Europe, forming with HUNGARY what is commonly spoken of as the 'dual monarchy' of AUSTRIA-HUNGARY, comprising several distinct nationalities, and consisting of two independent countries, each with its own parliament and government, but with one common sovereign, army, and system of diplomacy.

Ancient History of the Country till the year 982.—After the Romans had vanquished the Noricans, A.D. 33, and gained possession of the Danube, the country N. of the Danube, extending to the borders of Bohemia and Moravia, belonged to the kingdom of the Marcomanni and Quadi; a part of Lower Austria and Styria, with Vienna (Vindobona), a municipal city of the Roman Empire, belonged to Upper Pannonia; the rest of the country, with Carinthia and a part of Carniola, formed a portion of Noricum. Görz belonged to the Roman province of Illyricum, and Tyrol to Rhætia. These limits became confused by the irruptions of the barbarians. The Boii, Vandals, Heruli, Rugii, Goths, Huns, Lombards, and Avars, in the course of the fifth and sixth centuries, successively occupied the country. But after the year 568, when the Lombards had established their power in Upper Italy, the river Ens formed the boundary-line between the German tribe of Bajuvarii, the proprietors of the territory above the Ens, and the Avars, who had removed from the East to the banks of that stream. In 611 the Wendi, a

Slavonic tribe, appeared on the Murr, Drave, and Save. In 788 the duchy of Bavaria was dissolved, and the Avars passed over the Ens and invaded the counties of the Franks in the Bavarian territory. In 791 Charlemagne forced them to retire to the Raab, and united the territory extending from the Ens to the junction of the Raab with the Danube (the territory below the Ens) with Germany, under the name of *Avaria*, or *the Eastern Mark* (*Marchia Orientalis*), or *Austria*; and in the tenth century (in a document of Otho III., 996) it was called *Ostirrichi*, equivalent to the modern *Oesterreich*. Many colonists, particularly from Bavaria, were sent by Charlemagne into the new province, and a margrave was appointed to administer the government. The Archbishop of Salzburg was at the head of ecclesiastical affairs. After its separation from Verdun, in 843, Avaria formed the eastern boundary of the German Empire. On the invasion of Germany by the Hungarians, in 900, Avaria fell into their hands, and was held by them till 955, when the Emperor Otho I., in consequence of the victory of Augsburg, reunited a great part of this province to the Empire. By the power and address of its margraves the whole country was joined again with Germany, and in 1043, under the Emperor Henry III. and the margrave Albert I. (the Victorious), its limits were extended to the Leitha.

Austria under the House of Bamberg till 1282.—From 982 to 1156 the margraviate of Austria was hereditary in the family of the counts of Babenberg (Bamberg); the succession, however, was not regulated by primogeniture, but by the will of the emperor. In ancient documents mention is made of the estates of Austria in the year 1096. After Henry the Proud (duke of Bavaria and Saxony) was put under the ban of the empire, Leopold V., margrave of Austria, received the duchy of Bavaria in 1138 from the Emperor Conrad. But when the Margrave Henry, son of Leopold, under the title of *Ja-so-mir-Gott* (Yes-so-me-God), had again ceded it, in 1156, to Henry the Lion, the boundaries of Austria were extended so as to include the territory above the Ens, and the whole was created a duchy with certain privileges. Under this duke the court resided at Vienna. Duke Leopold VI., the son of Henry, received the duchy of Styria in 1192 as a fief from the Emperor Henry VI., it having been added to the empire by Otho I., in 955, by his victory over the Hungarians. It was this prince who imprisoned Richard Cœur de Lion (which see), king of England. Duke Leopold VII., the youngest son of the former, erected a palace within the city of Vienna, which was long occupied by the Austrian monarchs, under the name of the *old castle*. Leopold VII., called the *Glorious*, established the hospital of the Holy Cross, made Vienna, which had adopted a municipal constitution in 1198, a staple-town, and granted 30,000 marks of silver for the promotion of trade and commerce. In 1229 he purchased a part of Carniola from the ecclesiastical principality of Freisingen for 1650 marks, and left the country in a flourishing condition to the youngest of his three sons, Frederick II., surnamed the *Warrior*. In 1236 this prince was put under the ban of the empire, on account of his joining the alliance of the cities of Lombardy against the Emperor Frederick II.; and Otho, duke of Bavaria, seized upon his territory above the Ens as far as Lintz. The rest of the country was granted, as a fief by the emperor, to a margrave, and Vienna became an imperial city. During the emperor's campaign in Italy Duke Frederick recovered the principal part of his lands, and his rights were confirmed by the emperor at Verona, 1245. The rights of Vienna as an imperial city were abolished, and Frederick was to be called *king*, as sovereign of Austria and Styria; but all his expectations of empire were disappointed by his death in the battle of the Leitha against Bela IV., king of Hungary, July 15th, 1246, in the thirty-fifth year of his age. Thus the male line of the house of Bamberg became extinct.—The period from 1246 to 1282 is styled the *Austrian interregnum*. The Emperor Frederick II. declared Austria and Styria a vacant fief, the hereditary property of the German emperors, and sent a governor to Vienna, the privileges of which, as an imperial city, were once more renewed. But the female relations of the deceased Duke Frederick, his sister Margaret (widow of the Emperor Henry VI.), and his niece Gertrude, by the persuasion of Pope Innocent IV., in 1248, laid claim to the inheritance of their brother. The Margrave Hermann, with the aid of the Pope and a strong party, made himself master of Vienna, and of several Austrian cities. In Styria he was opposed by the governor Meinhard, count of Görz. But Hermann died in 1250, and his son Frederick, who was afterwards beheaded in 1268, at Naples, with Conradin of Suabia, was then only a year old. The whole country was distracted by various parties, and the Emperor Conrad IV. was prevented, by disputes with his neighbours, from turning his attention to Austria. In 1251 the states of Austria and Styria determined to appoint one of the sons of the second sister of Frederick the Warrior, Constantia (widow of the Margrave Henry the Illustrious), to the office of duke. Their deputies were on the way to Misnia when they were persuaded by King Wenceslaus, on their entrance into Prague, to declare his son Ottocar duke of Austria and Styria, who made every effort to support his appointment by arms, money, and especially by his marriage with the empress-widow Margaret. Ottocar wrested Styria from Bela, king of Hungary, by his victory of July, 1260, in the Marchfield; and in 1262 forced the Emperor Richard to invest him with both duchies. Soon after, by the will of his uncle Ulrich, the last duke of Carinthia and Friuli (who died 1269), Ottocar became master of Carinthia, a part of Carniola connected with it, the Kingdom of Istria, and a part of Friuli. But his arrogance soon caused his fall. In 1272 he refused to acknowledge Count Rodolph of Hapsburg emperor, and was obliged to defend himself against his arms. After an unsuccessful war he was forced to cede all his Austrian possessions in Nov. 1276. In 1277 he attempted to recover these territories, but, in the battle of the Marchfield, Aug. 26, 1278, he was slain, and his son Wenceslaus was obliged to renounce all claim to them, in order to preserve his hereditary estates. The Emperor Rodolph remained three years in Vienna, and then appointed his eldest son governor. But having succeeded in gaining the consent of the electors of Saxony and Brandenburg, of the three ecclesiastical electors, and of the count-palatine of the Rhine, he granted the duchies of Austria and Styria, with the province of Carinthia, to his two sons, Albert and Rodolph, Dec. 27, 1280.

This brings us to the *History of Austria under the House of Hapsburg*.—I. From 1282 to 1526. Albert and Rodolph transferred Carinthia to Meinhard, count of Tyrol, father-in-law to Albert. In 1283 they concluded a treaty, by which Albert was made sole possessor of Austria, Styria, and Carniola. Vienna, having again renounced its privileges as an imperial city, was made the residence of the court, and the successors of Rodolph, from this time, assumed *Austria* as the family title. The introduction of the Hapsburg dynasty was the foundation of the future greatness of Austria. The despotic Albert was assailed by Hungary and Bavaria and in 1298 he

won the Roman crown in an engagement with Adolphus of Nassau. After this he undertook the conquest of Switzerland; but was assassinated, May 1, 1308, at Rheinfelden, by his nephew, John of Suabia (see JOHN THE PARRICIDE), from whom he had basely withheld his hereditary estates. The inheritance of John now fell to the five sons of the murdered Albert—Frederick, surnamed the *Fair*, Leopold, Henry, Albert, and Otho. They were forced to purchase of the Emperor Henry VII. the investiture of their paternal estates (consisting, in 1308, of 26,572 square miles) for 20,000 marks of silver. Under their father, in 1301, the Margraviate of Suabia was added to the territories of Austria, and the contest with Bavaria ended in Austria obtaining Neuburg. On the contrary, the attempt of Duke Leopold, in 1315, to recover the forest towns of Switzerland, which had been lost under Albert, was frustrated by the valour of the troops of the Swiss confederacy in the battle of Morgarten. In 1314 his brother Frederick, chosen emperor of Germany by the electors, was conquered by his rival, the Emperor Louis (of Bavaria), in 1322, at Mühldorf, and was his prisoner for two years and a half in the castle of Trausnitz. The dispute with the house of Luxemberg, in Bohemia, and with Pope John XXII., induced the emperor, in 1325, to liberate his captive. Upon this the latter renounced all share in the government, and pledged himself to surrender all the imperial domains which were still in the possession of Austria. But Leopold considered the agreement derogatory to his dignity and continued the war against Louis. Frederick, therefore, again surrendered himself a prisoner in Munich. Moved by his faithful adherence to his word, Louis concluded a friendly compact with Frederick, and made preparations for their common government, Sept. 7, 1325. These preparations, however, were never carried into execution; for the agreement had been concluded without the consent of the electors. Leopold died in 1326, and Henry of Austria in 1327; Frederick also died without children, Jan. 13, 1330, after which his brothers, Albert II. and Otho, came to a reconciliation with the Emperor Louis. After the death of their uncle, Henry, margrave of Tyrol and duke of Carinthia (the father of Margaret Maultasch), they persuaded the emperor to grant them the investiture of Tyrol and Carinthia, in May, 1335: they ceded Tyrol, however, to John, king of Bohemia, by the treaty of Oct. 9, 1356, in behalf of his son John Henry, or rather of his wife, Margaret Maultasch. In 1344, after the death of Otho and his sons, Albert II., called the *Wise*, united all his Austrian territories, which, by his marriage with the daughter of the last Count of Pfirt, had been augmented by the estates of her father in 1324, and by the Kyburg estates in Burgundy in 1326. Of the four sons of Albert II. (Rodolph, Albert, Leopold, and Frederick), Rodolph II. (IV.) completed the Church of St. Stephen's, and died at Milan in 1365, without children, a short time after his youngest brother, Frederick. In 1379 the two surviving brothers divided the kingdom, so that Albert III. (with the Queue) became master of Austria, and gave the other territories to his brother, Leopold III. the Pious. Leopold had made repeated attempts to gain the Hapsburg possessions in Switzerland. He was killed July 9, 1386, on the field of Sempach, where he lost the battle, in consequence of the valour of Winkelried, and Albert administered the government of the estates of his brother's minor sons. Margaret Maultasch ceded Tyrol to him on the death of Meinhard, her only son, who was married to the sister of Albert. She retained nothing but a few castles and 6000 marks of gold. Her claims to Bavaria also she renounced in consideration of receiving Scharding and three Tyrolese cities, Kitzbühel, Ballenberg, and Kuffstein, and 116,000 florins of gold. In 1365 Leopold III. had bought the claims of the Count of Feldkirch for 36,000 florins; for 55,000 florins Austria received Brisgau from the Count of Fürstenberg, with the cities of Neuberg, Old Brisach, Kentzingen, and Billingen. The remainder of Carniola and the Windisch Mark, after the death of the last Count of Görz, were purchased, together with the county of Pludentz, from the Count of Werdenberg, and the possessions of the Count of Hogenberg, for 66,000 florins; and the city of Trieste was acquired in 1380 by aiding in the war between Hungary and Venice. Moreover, the two governments of Upper and Lower Suabia were pledged for 40,000 florins by the King of Rome, Wenceslaus, to Duke Leopold. The Austrian and Styrian lines, founded by Albert III. and Leopold III., his brother, continued for seventy-eight years. In 1395, when Albert III. died, his only son, Albert IV., was in Palestine. On his return he determined to take vengeance on Procopius, margrave of Moravia, for his hostile conduct; but he was poisoned in 1404 at Znaym. His young son and successor, Albert V., was declared of age in 1410; and being the son-in-law of the Emperor Sigismund, he united the crowns of Hungary and Bohemia in 1437, and connected them with that of Germany in 1438. But in the following year the young prince died. His posthumous son, Ladislaus, was the last of the Austrian line of Albert, and its possessions devolved on the Styrian line, 1457. From this time till 1806 the house of Austria furnished an unbroken succession of German emperors. Hungary and Bohemia were lost for a time by the death of Albert V., and, after the unhappy contests with the Swiss, under Frederick III., the remains of the Hapsburg estates in Switzerland. But several territories were gained; and, to increase the rising splendour of the family, the emperor conferred upon the country the rank of an archduchy. The dispute which broke out beween Frederick and his brothers Albert and Sigismund, relating to the division of their paternal inheritance, ended with the death of Albert in December, 1464. In the course of the troubles which resulted from this quarrel the emperor was besieged in the citadel of Vienna by the citizens, who favoured the cause of the murdered prince. Sigismund now succeeded to his portion of the estate of Ladislaus, and Frederick became sole ruler of all Austria. His son Maximilian, by his marriage with Mary, the surviving daughter of Charles the Bold, united the Netherlands to the Austrian dominions. But it cost Maximilian much anxiety and toil to maintain his power in this new province, which he administered as the guardian of his son Philip. His confinement at Bruges in 1489 resulted in an agreement which was decidedly for his advantage; but he lost at the same time the duchy of Guelders. After the death of his father, which happened Aug. 19, 1493, he was made Emperor of Germany, and transferred to his son Philip the government of the Netherlands. Maximilian I. (see this article and GERMANY) added to his paternal inheritance all Tyrol, and several other territories, particularly some belonging to Bavaria. He also acquired for his family new claims to Hungary and Bohemia. During his reign Vienna became the great metropolis of the arts and sciences in the German Empire. The marriage of his son Philip to Joanna of Spain raised the house of Hapsburg to the throne of Spain and the Indies. But Philip died in 1506, thirteen years before his father, and the death of Maximilian, which happened Jan. 12, 1519, was followed by the union of Spain and Austria: his grandson (the eldest son of Philip), Charles I., king

of Spain (see CHARLES V.), was elected Emperor of Germany. In the Treaty of Worms, April 28, 1521, and of Ghent, May 7, 1540, he ceded to his brother Ferdinand all his hereditary estates in Germany, and retained for himself the Kingdom of the Netherlands. The house of Austria was now the proprietor of a tract of country in Europe comprising 360,230 square miles. The Emperor Charles V. immediately increased the number of provinces in the Netherlands to seventeen, and confirmed their union with the German states, which had been concluded by his grandfather, under the title of the *circle of Burgundy*. In 1526 Austria was recognized as a European monarchy.

II. From 1526 to 1740.—Ferdinand I., by his marriage with Anna, the sister of Louis II., king of Hungary, who was killed in 1526 in the battle of Mohacs, acquired the kingdoms of Hungary and Bohemia, with Moravia, Silesia, and Lusatia, the appendages of Bohemia. Bohemia rejoiced to hail Ferdinand its king. Notwithstanding the divided opinions of the nobles, and the rising fortune of his adversary, John von Zapolya (see HUNGARY), he was raised to the throne of Hungary, Nov. 26, 1526, by the Hungarian Diet, and was crowned Nov. 5, 1527. But Zapolya resorted for assistance to the sultan, Soliman II., who appeared in 1529 at the gates of Vienna. The capital was rescued from ruin solely by the prudent measures of the Count of Salm, general of the Austrian army, and the imperial forces compelled Soliman to retreat. In 1535 a treaty was made by which John von Zapolya was allowed to retain the royal title and half of Hungary, and his posterity were to be entitled to nothing but Transylvania. But after the death of John new disputes arose, in which Soliman was again involved, and Ferdinand maintained the possession of Lower Hungary only by paying the warlike sultan the sum of 30,000 ducats annually. This took place in 1562. Ferdinand was equally unsuccessful in the duchy of Würtemberg. This province had been taken from the restless Duke Ulrich by the Suabian Confederacy, and sold to the Emperor Charles V.; and when his estates were divided it fell to Ferdinand. Philip, landgrave of Hesse, the friend of Duke Ulrich, took advantage of the opportunity offered him by the embarrassment of Ferdinand in the Hungarian war. With the aid of France he conquered Würtemberg; but France ceded it again to Ulrich in the Treaty of Caden, in Bohemia, concluded June 29, 1534, on condition that the province should still be a fief of Austria, and after the extinction of the male line of the duke that it should revert to that country. The remaining half of Bregentz, the county of Thengen, and the city of Constance were insufficient wholly to compensate these losses; nevertheless, the territory of the German line of the House of Austria was estimated at 114,468 square miles. Ferdinand received also the imperial crown in 1556, when his brother Charles laid by the sceptre for a cowl. He died July 25, 1564, with the fame of an able prince, leaving three sons and ten daughters. According to the directions given in his will, the three brothers divided the patrimony, so that Maximilian II., the eldest son, who succeeded his father as emperor, obtained Austria, Hungary, and Bohemia; Ferdinand, the second son, received Tyrol and Hither Austria; and Charles, the third, became master of Styria, Carinthia, Carniola, and Görz. But in 1595, after the death of the Archduke Ferdinand, the husband of Philippine Welser, the fair maid of Augsburg, his sons Andrew (cardinal and bishop of Constance and Brixen, and governor of the Netherlands for Spain) and Charles (margrave of Burgau) were declared incompetent to succeed their father, and his possessions reverted to his relations. In Hungary the Emperor Maximilian met with far better fortune than his father had done. The death of Soliman at Szigeth in 1566 was followed by a peace, and in 1572 Maximilian crowned his eldest son, Rodolph, king of Hungary; he was afterwards crowned King of Bohemia, and elected King of Rome. In his attempts to add the Polish crown to his Austrian dominions he was equally unsuccessful with his fourth son, Maximilian, who engaged in a similar enterprise after the decease of Stephen Bathori in 1587. Maximilian died Oct. 12, 1576, and Rodolph, the eldest of his five sons, succeeded to the imperial throne. The most remarkable events by which his reign is distinguished are the war against Turkey and Transylvania, the persecutions of the Protestants, who were all driven from his dominions, and the circumstances which obliged him to cede Hungary in 1608, and Bohemia and his hereditary estates in Austria in 1611, to his brother Matthias. From this time we may date the successful exertions of the Austrian sovereigns to put down the restless spirit of the nation, and to keep the people in a state of abject submission. Matthias, who succeeded Maximilian on the imperial throne, concluded a peace for twenty years with the Turks; but he was disturbed by the Bohemians, who took up arms in defence of their religious rights. Matthias died March 20, 1619, before the negotiations for a compromise were completed. The Bohemians refused to acknowledge his successor, Ferdinand II., and chose Frederick V., the head of the Protestant league, and Elector of the palatinate, for their king. After the battle of Prague, 1620, Bohemia submitted to the authority of Ferdinand. He immediately applied himself to eradicate Protestantism out of Bohemia Proper and Moravia. At the same time he deprived Bohemia of the right of choosing her king, and of her other privileges. He erected a Catholic court of reform, and thus led to the emigration of thousands of the inhabitants. The house of Hapsburg has presented an example, which stands alone in history, of the manner in which violence and tyranny can check the progress of civilization; and Bohemia, the land of Huss, the land where religious freedom has been defended with such heroic zeal, was long greatly inferior in cultivation to every other country of Western Europe. The Austrian states also favouring, in general, the Protestant religion, were compelled by Ferdinand to swear allegiance to him, and Lutheranism was strictly forbidden in all the Austrian dominions. The province of Hungary, which revolted under Bethlem Gabor, prince of Transylvania, was, after a long struggle, subdued. This religious war dispeopled, impoverished, and paralyzed the energies of the most fertile provinces of the house of Austria. During the reign of Ferdinand III., the successor of Ferdinand II. (1637–57), Austria was continually the theatre of war. In the midst of these troubles Ferdinand ceded Lusatia to Saxony at the peace of Prague, concluded in 1635; and when the war was ended he ceded Alsace to France, at the peace of Westphalia in 1648. The emperor Leopold I., son and successor of Ferdinand III., was victorious through the talents of his minister Eugene, in two wars with Turkey; and Vienna was delivered by John Sobieski (see SOBIESKI), and the Germans from the attacks of Kara Mustapha in 1683. In 1687 he changed Hungary into an hereditary kingdom, and joined to it the territory of Transylvania, which had been governed by distinct princes. Moreover, by the Peace of Carlovitz, concluded in 1699, he restored to Hungary the country lying between the Danube and the Theiss. It was now the chief aim of Leopold to secure to Charles, his second son, the inheritance of the Spanish monarchy,

then in the hands of Charles II. king of Spain, who had no children to succeed him; but his own indecision, and the artful policy of France, induced Charles II. to appoint the grandson of Louis XIV. his successor. Thus began the war of the Spanish Succession in 1701. Leopold died May 5, 1705, before it was terminated. The Emperor Joseph I., his successor and eldest son, continued the war, but died without children, April 17, 1711. His brother Charles, the destined king of Spain, immediately hastened from Barcelona to his hereditary states, to take upon him the administration of the government. He was elected emperor December 24 of the same year; but was obliged to accede to the Peace of Utrecht, concluded by his allies at Rastadt and Baden in 1714. By this treaty Austria received the Netherlands, Milan, Mantua, Naples, and Sardinia. In 1720 Sicily was given to Austria in exchange for Sardinia. The duchy of Mantua, occupied by Joseph in 1708, was now made an Austrian fief, because it had formed an alliance with France prejudicial to the interests of Germany. This monarchy now embraced 191,621 sq. miles. Its annual income was between 13,000,000 and 14,000,000 florins, and its army consisted of 130,000 men; but its power was weakened by new wars with Spain and France. In the peace concluded at Vienna 1735 and 1738, Charles VI. was forced to cede Naples and Sicily to Don Carlos, the infant of Spain, and to the King of Sardinia a part of Milan, for which he received only a part of Parma and Piacenza. In the next year, by the Peace of Belgrade, he lost nearly all the fruits of Eugene's victories, even the province of Temeswar; for he was obliged to transfer to the Porte Belgrade, Servia, and all the possessions of Austria in Walachia and Bosnia. All this Charles VI. willingly acceded to, in order to secure the succession to his daughter, Maria Theresa, by the Pragmatic Sanction. This law of inheritance was passed 1713–19, and acknowledged one after another by all the European powers.

History of Austria under the house of Hapsburg-Lorraine.—I. From 1740 to 1790. By the death of Charles VI., Oct. 20, 1740, the male line of the Austrian house of Hapsburg became extinct; and Maria Theresa (which see) having married Stephen, duke of Lorraine, ascended the Austrian throne. On every side her claims were disputed, and rival claims set up. A violent war began in which she had no protector but Britain. Frederick II. of Prussia subdued Silesia; the elector of Bavaria was crowned in Lintz and Prague, and in 1742 chosen emperor under the name of Charles VII. Hungary alone supported the heroic and beautiful queen. But in the Peace of Breslau, concluded June 4, 1742, she was obliged to cede to Prussia Silesia and Glatz, with the exception of Teschen, Jagerndorf, and Troppau. Frederick II., by assisting the party of Charles VII., soon renewed the war. But Charles died Jan. 20, 1745, and the husband of Theresa was crowned emperor of Germany under the title of Francis I. A second treaty of peace, concluded December 25, 1745, confirmed to Frederick the possession of Silesia. By the Peace of Aix-la-Chapelle, Oct. 18, 1748, Austria was obliged to cede the duchies of Parma, Piacenza, and Guastalla to Philip, infant of Spain, and several districts of Milan to Sardinia. The Austrian monarchy was now firmly established; and it was the first wish of Maria Theresa to recover Silesia. With this object in view she formed an alliance with France, Russia, Saxony, and Sweden. This was the origin of the Seven Years' war; but, by the Peace of Hubertsberg, 1763, Prussia retained Silesia, and Austria had sacrificed her blood and treasure in vain. The first paper money was now issued in Austria, called *state obligations*, and the Emperor Francis erected a bank to exchange them. After his death, August 18, 1765, Joseph II., his eldest son, was appointed colleague with his mother in the government of his hereditary states, and elected Emperor of Germany. To prevent the extinction of the male line of her family Maria Theresa now established two collateral lines; the house of Tuscany, in her second son, Peter Leopold; and the house of Este, in the person of the Archduke Ferdinand. For these separations Maria Theresa indemnified the country by the confiscation of several cities, formerly pledged to Poland by Hungary, without paying the sum for which they stood pledged; by obtaining Galicia and Lodomeria in the first profligate division of the Kingdom of Poland in 1772; and by the capture of Bukowina, which was ceded by the Porte in 1777. In the Peace of Teschen, May 13, 1779, Austria received Innviertel, and the vacant county of Hohenembs in Suabia, the county of Falkenstein, and the Suabian territories of Tettnang and Argen; and thus at the death of the empress, Nov. 28, 1780, Austria contained 234,684 square miles: it had lost 16,366 square miles, and gained 34,301. The pop. was estimated at 24,000,000; but the public debt also had increased to 160,000,000 florins. The administration of the empress was distinguished by substantial improvements in connection with government, agriculture, trade, and commerce, the education of the people, the promotion of the arts and sciences, and of religion. The foreign relations of the kingdom also, even those with the Roman court, were happily conducted by the talents of her minister Kaunitz. Her successor, Joseph II., was active and restless; impartial, but too often rash and violent. While a colleague with his mother in the government he diminished the expenses of the state, and introduced a new system in the payment of pensions and of officers. But after the death of his mother all his activity and talent as a sovereign was fully developed. As severe to the military as to the civil officers, he adhered, however, to liberal principles. The censorship of the press was reformed; the Protestants received full toleration, and the rights of citizens; the Jews were treated with kindness; 900 convents and religious establishments were abolished, and even the visit of Pius VI. made no alteration in Joseph's system of reformation. The system of education he subjected to revision and improvement; and he tried to foster manufactures by duties on foreign goods. But his zeal excited the opposition of the enemies of improvement. The Low Countries revolted, and his vexation probably led him to attempt the exchange of the Netherlands, under the title of the *Kingdom of Austrasia*, for the palatinate of Bavaria under an elector. But the project was frustrated by the constancy and firmness of the next agnate, the Duke of Deux-Ponts, and by the German league concluded by Frederick II. Joseph was equally unsuccessful in the war of 1788 against the Porte. His exertions in the field destroyed his health; and grief at the rebellious disposition of his hereditary states accelerated his death, which happened Feb. 20, 1790.

II. From 1790 onward.—Joseph II. was succeeded by his eldest brother Leopold II. By his moderation and firmness he quelled the turbulent spirit of the Netherlands, and restored tranquillity to Hungary. The Treaty of Reichenbach with Prussia, July 27, 1790, and the Treaty of Sistova, Aug. 4, 1791, led to a peace with the Porte. The unhappy fate of his sister and her husband Louis XVI. of France induced him to form an alliance with Prussia, but he died March 1, 1792, before the revolutionary war broke out. Soon after the accession of his son, Francis II., to the throne, and before the 14th of July.

1792, when he was elected German Emperor, France declared war against him as King of Hungary and Bohemia. (See FRANCE.) In the first articles of peace, dated at Campo-Formio, Oct. 17, 1797, Austria lost Lombardy and the Netherlands, and received, as a compensation, the largest part of the Venetian territory; two years previous, in 1795, in the third division of Poland, the Austrian dominions had been enlarged by the addition of West Galicia. In the beginning of the year 1799 the Emperor Francis, in alliance with Russia, renewed the war with France. But Napoleon extorted the Peace of Lunéville, Feb. 9, 1801, and Francis acceded to it, without the consent of Britain. By the conditions of the treaty he was to cede the county of Falkenstein and the Frickthal. Ferdinand, grand-duke of Tuscany, at the same time renounced his claim to this province, and received, in return for it, Salzburg and Berchtesgaden, with a part of the territory of Passau, and was afterwards made master of the largest part of Eichstädt, and honoured with the title of *elector*. Austria obtained the Tyrolese archbishoprics Trent and Brixen, and, notwithstanding its cessions of territory to France, had gained, including its acquisitions in Poland, 9580 square miles; this made the whole extent 253,770 square miles. The public debt had also increased to 1220 million florins. The first consul of France now caused himself to be proclaimed emperor; and Aug. 11, 1804, Francis declared himself hereditary emperor of Austria, and united the Austrian states under the name of the Empire of Austria. Immediately after this important act he took arms once more with his allies Russia and Great Britain against the government of France. The war of 1805 was terminated by the Peace of Presburg (Dec. 26, 1805). By the conditions of the treaty Francis was obliged to cede to France the remaining provinces of Italy; to the King of Bavaria, Burgau, Eichstädt, a part of Passau, all Tyrol, Vorarlberg, Hohenembs, Rothenfels, Tettnang, Argen, and Lindau; to the King of Würtemberg the five towns lying on the Danube, the county of Hohenberg, the landgraviate of Nellenburg, Altdorf, and a part of Brisgau; and to the Grand-duke of Baden the remainder of Brisgau, Ortenau, Constance, and the commandery of Meinau. He received, in return, Salzburg and Berchtesgaden; the elector of Salzburg was compensated by the province of Würzburg; and the dignity of grand master of the Teutonic order was made hereditary in the house of Austria. Thus ended a war which cost the Austrian monarchy, besides the territories just enumerated, 90,000,000 florins, which were carried away by the French from Vienna, and 800,000,000 for the other expenses of the war; of which Francis paid a large proportion from his private purse. After the formation of the Confederation of the Rhine (July 12, 1806) Francis was forced to resign his dignity as Emperor of Germany (Aug. 6, 1806), which had been in his family more than 500 years. The old German, or Holy Roman, Empire thus came to an end, and Francis had now only the title of *Francis I., emperor of Austria*. In 1809 he resolved on a new war with France, aided only by Great Britain, which did nothing more than furnish some pecuniary assistance, and made a useless attack on Walcheren. Austria fought courageously, but in vain. The Peace of Vienna (Oct. 14, 1809) cost the monarchy 42,380 square miles of territory, 3,500,000 subjects, and more than 11,000,000 florins of revenue. The public debt was also increased to 1200 million florins, and all the paper money in circulation was estimated at 950,000,000. Napoleon, after tearing from the Austrian Monarchy its fairest provinces—the Duchy of Salzburg, with Berchtesgaden, Innviertel, Western Hausruckviertel, Carniola, and Görz, Trieste, the circle of Villach, a large part of Croatia, Istria, a part of the Grisons, the Bohemian territories in Saxony, all West Galicia, the circle of Zamoski in East Galicia, Cracow, with half the salt-works of Wieliczka, the circle of Tarnopol, and many other territories which were given to Russia—formed a personal connection with the ancient family of Hapsburg, by his marriage with Maria Louisa, daughter of the Emperor of Austria, and (March 14, 1812) concluded an alliance with the Emperor Francis against Russia. But the Emperor of France was repulsed on his invasion of this country; Prussia rose up against him; and after the Congress of Prague had separated without accomplishing anything, Francis (Aug. 12, 1813) declared war against France, and formed an alliance (Sept. 9, 1813) at Teplitz, with Britain, Russia, Prussia, and Sweden, against his son-in-law. In the battle of Leipzig, the Austrian troops took an honourable part. The firmness with which the emperor signed the act of proscription against his son-in-law, and fixed the fate of his daughter and her infant, excited general respect. He signed the same act against Napoleon a second time, when he returned from Elba. He also opposed Murat in Italy. Yet the Austrian cabinet endeavoured to provide for young Napoleon in the settlement of the affairs of France. By the Congress of Vienna, 1814–15, Austria gained the portion of Italy which is usually known as Lombardy and Venetia, and recovered, together with Dalmatia, the hereditary territories which it had been obliged to cede. The former Grand-duke of Würzburg, on the contrary, ceded his territory to Bavaria, and again took possession of Tuscany. The final act resulting from the Congress was signed in 1820. In 1821 liberal movements in Italy were put down. The July revolution of 1830, in France, caused warlike preparations to be made; but after Great Britain had acknowledged the new government, Austria acknowledged it also. Insurrections which took place in Modena, Parma, and the Papal States, 1831–32, were suppressed without much difficulty. In the London conference relative to the affairs of Belgium Austria took an active share; but in proportion as Great Britain and France became more closely united, Austria entered into more intimate relations with Russia and Prussia. In the Polish insurrection Austria ultimately gave indications of a strong leaning in favour of Russia.

The death of the Emperor Francis I. (March 2, 1835) and the accession of Ferdinand I. made little change in the Austrian system of government. Metternich still continued at the head of affairs and to foster the reactionary policy. In 1846 the failure of the Polish insurrection had led to the incorporation of Cracow with Austria, but discontent with the government very widely prevailed in the empire. In Italy, the declarations of Pio Nono in favour of reform, and the concessions into which most of the other governments of the Italian peninsula had been hurried, increased the difficulties of Austria. In Hungary the constitutional opposition became stronger and stronger, and latterly, under the guidance of Kossuth and other popular agitators, assumed the form of a great constitutional movement. In 1848 the expulsion of Louis Philippe shook all Europe to its foundations. Metternich found it impossible any longer to guide the helm of the state, and government found itself compelled to grant a free press, and allow the citizens freely to arm themselves. The popular movement made great progress in Hungary; and in Italy a formidable insurrection broke out, threatening the very existence of the Austrian power in the peninsula. In the very centre of

the empire, in Vienna itself, the insurrection made equal progress, and the royal family, no longer in safety, removed to Innsbruck. The Austrian monarchy appeared now to be hanging by a thread. The Hungarian Diet declared itself permanent, under the presidency of Kossuth. Various ministerial changes took place, and at last the emperor abdicated in favour of his nephew, Francis Joseph. More vigorous measures were now adopted, and Austria, strongly aided by the forces of Russia, succeeded in suppressing the Hungarian insurrection. Haynau, on the occasion, rendered himself notorious by his severity, and Hungary underwent the fate of a conquered country. The year 1855 is memorable in Austrian history for the conclusion of a concordat with the Pope which put the educational and ecclesiastical affairs of the empire entirely into the hands of the Papal see. It established an ecclesiastical censorship of the press, and placed all schools, even private schools, under the surveillance of the bishops; it proclaimed the complete independence of the bishops in relation to the civil government, so that all decrees proceeding from Rome might be published without obtaining the royal *placet*, and it authorized the bishops to convoke the provincial councils and diocesan synods without the consent of the civil authority.

In 1859 the hostile intentions of France and Sardinia against the possessions of Austria in Italy became so evident, that she declared war by sending an army across the Ticino, but after disastrous defeats at Magenta and Solferino she was compelled to cede Milan and the N.W. portion of Lombardy to the Sardinian king. In 1864 she joined with Prussia and the other German states in the spoliation of Denmark, but a dispute about the conquered provinces of Schleswig-Holstein involved her in a war with her allies (1866), while at the same time Italy renewed her attempts for the recovery of Venice. Austria had accordingly to show front both in the N. and in the S. The southern army under Archduke Albert fought successfully, defeating the Italians under Victor Emanuel at Custozza (June 24), and driving them back across the Mincio, but the fortune of the northern army under General Benedek was very different. On 3d July Benedek was completely defeated by the Prussian forces at Königgrätz (Sadowa) in Bohemia, and the road to Vienna lay open to the victors. Francis Joseph now ceded Venetia to Napoleon III., and claimed his intervention to assist in procuring a peace, evidently wishing to make a separate treaty with Italy, so as to be at liberty to employ the southern army against Prussia. This design did not succeed, however. Both Italy and Prussia were willing to accept the mediation of Napoleon, but Italy would not hear of a separate arrangement, and continued the war. On July 20 Admiral Tegetthoff defeated the Italian fleet near the Dalmatian island Lissa; but, on the other hand, the Prussians continued to advance into Austria, and threatened Vienna. Francis Joseph accordingly saw himself obliged to conclude a peace with Prussia (Aug. 23), and a little later peace was concluded with Italy also (Oct. 3). The result of the war was the cession of Venetia through France to Italy, and the withdrawal of Austria from all interference in the affairs of Germany.

Since 1866 Austria has been occupied chiefly with the internal affairs of the empire. The first aim of the government was to restore the constitution of the state, which had been established in February, 1861, but which had been suspended since 1865 owing to the demand of Hungary for self-government. As Austrian statesmen were anxious for a settlement of the dispute, the Hungarian demands were finally agreed to, and the Empire of Austria divided into two parts, the one made up of the Cisleithan or Slavonic-German provinces, the other of the Transleithan provinces, the latter forming together the Kingdom of Hungary. These two divisions of the empire were to be entirely independent, except in matters of diplomacy and military and naval matters—to some extent also in matters of finance. This settlement was consummated by the coronation of the Emperor Francis Joseph I. as King of Hungary, which took place at Budapest, on the 8th of June, 1867.

During the session of the Reichsrath, that is, the diet of the Cisleithan provinces, held in the same year, the important question of the concordat of 1855 came up for discussion. The Liberal majority in the diet were desirous of seeing it entirely repealed, but as they fully recognized the insuperable obstacles in the way of this step, they were content to proceed by separate enactments intended to weaken the power that had been gained to the Papal see by the concordat. With this end in view three measures were brought forward, one for the re-establishment of civil marriage, one for the emancipation of the schools from the domination of the church, and one for the placing of the different creeds on a footing of equality. Before the 25th of May, 1868, all these measures had passed through both houses of the diet, and on that day they received the imperial sanction. These laws were declared by the pope to be 'abominable', as well as null and void. Further enactments having in view the weakening of the power of the papal see in the state were passed in 1874, and were condemned by the pope in the severest terms.

The fact of the Austro-Hungarian dominions comprising so many different nationalities with different languages has always given the government a great deal of trouble, both in the management of internal affairs and in regard to external matters. In recent revivals of the Eastern question, for instance, the course of Austria has been hampered by the sympathy shown by the Magyars for the Turks, while her Slav subjects have been naturally more favourable to Russia. Previous to the outbreak of hostilities between Russia and Turkey in 1877 she joined with the other powers in remonstrance with Turkey, but as to the actual struggle remained neutral. At the close of the war in 1878 Austria took part in the congress of Berlin, where the settlement of the Eastern question was arranged, and by this congress it was decided that the provinces of Bosnia and Herzegovina should in future be administered by Austria-Hungary instead of Turkey. They were fully annexed in 1908. The recent history of the monarchy has been uneventful, but there has been considerable friction between the different nationalities and political parties.

The dual monarchy extends from about lat. 42° to 51° N., taking the extreme limits, but the bulk of it lies between lat. 44° 30′ and 51° N., and between lon. 8° 30′ and 26° 30′ E.; the total area in round numbers is 260,000 square miles. Its greatest length from E. to W. is about 860 miles; its greatest breadth from N. to S. may be stated at about 460 miles; bounded S. by Roumania, Servia, Turkey, Montenegro, the Adriatic, and Italy; W, by Switzerland, Bavaria, and Saxony; N. by Prussia and Russian Poland; and E. by Russia and Roumania. On the shores of the Adriatic, along the coasts of Dalmatia, Croatia, Istria, &c., lies its only sea frontage, which, compared to the size of the monarchy, is of insignificant extent.

Besides being divided into the two great divisions above mentioned, the Austro-Hungarian Monarchy is further divided into a number of governments or provinces. The following table exhibits the name and area of these governments, with their population in 1890 and 1908:—

Divisions.	Area in sq. m.	Population, 31st Dec., 1890.	Population, 31st Dec., 1908.	Chief Towns.
Austrian Provinces—				
Lower Austria	7,631	2,661,799	3,492,660	Vienna.
Upper Austria	4,625	785,331	840,909	Linz.
Salzburg	2,762	173,510	214,651	Salzburg.
Styria	8,630	1,282,708	1,432,483	Gratz.
Carinthia	3,987	361,008	378,230	Klagenfurt.
Carniola	3,873	498,958	521,808	Laibach.
Triest and territory	37	157,466	203,959	Triest.
Görz and Gradisca	1,127	220,308	249,048	Görz.
Istria	1,912	317,610	379,817	Rovigno.
Tyrol	10,303	812,696	909,244	Innsbruck.
Vorarlberg	1,004	116,073	143,781	Innsbruck.
Bohemia	20,050	5,843,094	6,708,206	Prague.
Moravia	8,578	2,276,870	2,591,971	Brünn.
Silesia	1,987	605,649	754,156	Troppau.
Galicia	30,304	6,607,816	7,999,259	Lemberg.
Bukowina	4,030	646,591	802,102	Czernowitz.
Dalmatia	4,953	527,426	641,765	Zara.
	115,793	23,895,413	28,264,049	
Hungarian Kingdom—				
Hungary and Transylvania	107,984	15,231,527	18,390,967	Budapest.
Croatia and Slavonia	16,411	2,201,927	2,693,346	Agram.
Fiume	8	30,337	46,429	Fiume.
	124,403	17,463,791	21,130,742	
Bosnia and Herzegovina	19,696	—	1,855,835	Serajevo.
Total	259,892	41,359,204	51,250,626	

Natural Features.—Although presenting every variety of surface, the prevailing character of the above dominions is mountainous, there being few regions where mountains are not found; while the plains do not occupy more than a fifth part of the whole superficies. The loftiest ranges, and the most extensively ramified, are found in Tyrol, Styria, Salzburg, and the S. parts of Austria proper. In some of these regions the scenery is bold and romantic, and has been considered equal to that of Switzerland. The most extensive tracts of low or flat land occur in Slavonia and the S.E. and central parts of Hungary; much of this level land is remarkably fertile, but it is met at various points by vast morasses and arid steppes. The principal valleys are found in Tyrol, Salzburg, Upper Austria, Styria, and Carinthia. Extensive plains stretch along the courses of the rivers, particularly the Danube, the Theiss, and the March. The principal rivers of Austria are the Danube, the Elbe, the Save, the Drave, the Waag, the March, the Inn, the Teiss or Theiss, and the Maros. The Danube, for upwards of 800 miles, is navigable for pretty large vessels, that is, throughout the whole monarchy; while the others, most of them tributaries of the Danube, are navigable for vessels of smaller size. All of them abound in fish. The lakes are numerous and often picturesque, though those in the low lands, particularly in the plains of Hungary, are rather marshes than lakes.

The monarchy lies between the isotherms of 60° and 50°, and has a climate nearly as various as its surface. The N. regions, between the 49th and 51st degrees of N. latitude, have an average temperature resembling that of the N. of France. Between lat. 46° and 49° the heat is considerable; and between 42° and 46°, which comprises the whole of South Austria, it is still greater; the winter lasting two or three months only, and being, in general, extremely mild. The principal products of the N. are wheat, barley, oats, and rye; in the centre, vines and maize are added; and in the S., olives. The sugar-beet is in many parts an important crop. But agriculture is in a backward state on the whole. The wines are mostly inferior, with exception of a few choice kinds, including the famous Hungarian Tokay. A great portion of the worst wine is made into brandy. The vineyards of Hungary yield by far the largest proportion. The forests cover 69,000 square miles, or one-third of the productive soil of the monarchy, and yield timber of excellent quality, adapted for all purposes.—Wild deer, wild swine, chamois, foxes, lynxes, and a species of small black bear, are found in many districts, the fox and lynx being particularly abundant. Herds of a native breed of horses, of small size, roam wild over the plains of Hungary. All the domestic animals of England are known throughout the monarchy.

A large portion of the countries now composing the dual monarchy was at one time submerged by the sea, particularly Hungary, where the general appearance of its vast plains, the nature of their soil, and, above all, the occurrence of fossil sea-shells, leave no room to doubt the former dominion of the ocean. Throughout nearly all divisions the tertiary formation prevails, with a margin of the secondary formation, stretching to a greater or lesser extent into the surrounding countries, and diversified by patches of igneous rocks of the tertiary and alluvial epochs. In mineral productions Austria is very rich, possessing, with the exception of platinum, all the metals. We may more particularly mention gold, silver, iron, copper, lead, tin, zinc, quicksilver, coal, and salt. The Austrian provinces produce coal to the value of about £11,000,000 annually, about one-half being lignite or brown coal. Iron is produced to the value of about £5,000,000. Hungary is less rich in mineral wealth.

Manufactures and Commerce.—Manufactures are in the most flourishing condition in Bohemia, Moravia, Silesia, and Lower Austria; less so in Hungary proper, and insignificant in Dalmatia, Bukowina, and Croatia and Slavonia. As regards the individual branches of manufacture, those connected with iron and steel machinery and engineering are well established in various large cities and elsewhere, especially in Bohemia, Moravia, Upper and Lower Austria, and Silesia. Vienna, Prague, Brünn, Gratz, and Triest deserve special mention. In the manufacture of musical and scientific instruments Austria holds a high position; those of Vienna are especially celebrated. The manufacture of pottery and china ware is very extensive, and gives rise to a brisk export trade. The glass manufacture is one of the oldest and most highly developed branches of industry in Austria. The manufactories, about 200 in number, are spread over the whole of the mon-

archy, but are most numerous in Bohemia, where glass and glass-wares of every kind are produced. The yearly value of this class of manufactures is estimated at about £3,500,000, of which a very considerable quantity is exported. The metal goods already referred to include not only those of iron and steel, some of which, such as scythes and reaping-hooks, have a world-wide reputation, but also those of brass, copper, &c. The manufacture of gold and silver plate and jewelry is important, and the articles of Vienna workmanship compete successfully with the French. The production of chemicals reaches the amount of £5,000,000, and about covers the home demand. As regards articles of food, the sugar from beet has an annual value of about £12,000,000; of beer (including Pilsener and other sorts) the production is £4,000,000 in value, the number of breweries is over 1300; spirits are distilled to the value of £3,500,000. The manufacture of tobacco is a state monopoly, and is carried on mostly in large establishments. Of textile industries, manufactures of woollen and linen goods are among the oldest, most widely spread, and most important of the state. The first gives employment to about 400,000 persons (including home workers), and turns out about £14,000,000 worth of goods yearly, of which a considerable proportion is annually exported. In the whole monarchy there are about 800,000 spindles employed in woollen weaving. The linen manufacture (including both hemp and jute) also gives employment to a great number of persons (many of them in their homes), and produces goods to a great value. The chief seats of the manufacture are Bohemia, Moravia, and Silesia. The annual produce of the cotton manufacture is next in value to that of woollens. Although about 3,000,000 spindles are in activity, cotton yarn has to be imported. On the other hand, however, cotton cloths, which enjoy a very good reputation, are exported. Tanning is carried on to the greatest extent in Moravia, Lower Austria, and Bohemia, yet not sufficiently to supply the demand. The manufacture of leather goods, however, is very large, and in the production of gloves (in Vienna and Prague) Austria stands next to France. Altogether the manufacture of leather and leather goods employs about 200,000 persons and produces goods to about £10,000,000 yearly.

In addition to the general import and export trade, Austria carries on—partly from its central position in the continent of Europe, and partly from its numerous navigable streams, excellent roads, and in later times its partially completed railway system—a very considerable amount of business in the transit of goods from and to other countries. In 1887 the total value of the imports into Austria-Hungary was, in round numbers, £53,900,000, while the value of the exports was £69,860,000; the respective figures for the year 1903 were £82,711,000 and £90,708,000, for 1909 £115,800,000 and £96,400,000. It may be noticed that the imports in the last year much exceed in value the exports; this is explained as being partly due to a deficient harvest necessitating the import of a large quantity of grain, partly to a deficiency in the expansion of the export of manufactured articles. The principal import is raw cotton, which was imported in 1909 to the value of £13,678,800; wool being imported to the value of £7,731,200; wheat to that of £6,724,800; metals to the value of £4,792,700; silk and silk goods to the value of £4,499,300; coffee to the value of £2,400,200; tobacco to the value of £2,049,900; flax, hemp, jute to the value of £3,039,400; coal and coke to the value of £7,817,400. Among the other chief articles machinery, locomotives, &c., were imported to the value of £4,225,000; instruments, watches, fancy goods, &c., to the value of nearly £2,296,000; paper and paper goods to the value of £1,316,000; maize and rice to the value of £1,838,600; fruits and vegetables to the value of £1,621,000; oil-seeds and other kinds of seeds to the value of £2,000,000. Sugar formed the chief article of export, the value of this product being in 1909 £10,096,000; next came ironware, machinery, and metal goods to the value of £4,566,000; eggs to the value of £4,009,000. Cattle were exported to the value of £2,126,000; grain to the value of £3,200,000; hides and skins, £3,391,000; leather wares, £1,938,000; brown coal, £3,600,000; woollen manufactures, £2,683,000; glass and glass-ware, £3,114,000; paper and paper wares, £1,726,000; woodware, £2,594,000. Nearly one-half of the commerce of Austria-Hungary is carried on with Germany, the next places being occupied by Great Britain, Italy, Russia, and the United States. The trade of Great Britain with Austria-Hungary is growing steadily, but its real amount cannot be determined, as the Board of Trade returns only give the trade carried on directly between British and Austrian ports, and not that passing through other countries. The exports by sea to the United Kingdom in 1909 were £9,960,649; the imports thence, £8,491,527. The staple exports to the United Kingdom are sugar, grain, and flour, others being leather and leather goods, glass-ware, eggs, silks, paper, &c. The chief imports from Britain include cotton and woollen yarn and goods, machinery, metals and metal goods, leather and leather goods, coal, rubber goods, &c. In 1909 Austria-Hungary's imports from British India amounted to £7,685,224; the exports to India amounted to £2,524,247.

Including fishing vessels and small craft, Austria-Hungary, in 1909, had 14,999 vessels of all sizes, with a tonnage of 497,114, and employing 42,200 men. Of these 208 of 426,837 tons were sea-going vessels. The principal ports are Triest, Pola, and Fiume. There are about 24,000 miles of railway open for traffic in Austria-Hungary, of which 12,000 are in Austria proper.

Money, Weights, and Measures.—Recently the monetary system has been remodelled, the coinage being changed from a silver to a gold basis, the standard coin and money of account being the krone or crown = 100 heller, or about 10*d.* sterling, or 24 to the pound sterling. The gold 100-crown piece = 83*s.* 4*d.*; 20-crown piece = 16*s.* 8*d.*; the 10-crown piece = 8*s.* 4*d.*; the ducat = 9*s.* 4¾*d.* The crown is a silver coin, and there is also a silver five-crown piece, with smaller coins in nickel and bronze. Previously accounts were kept in gulden or florins of 100 kreutzers each, the value of the florin (which is a silver coin) being nominally 2*s.* sterling, really about 1*s.* 8*d.* Practically the chief medium of exchange is bank-notes, of various denominations. The Austrian centner, the weight by which all large quantities are rated, is 123½ lbs. avoirdupois. The metze (*plural*, metzen), the largest dry measure = 1·7 of a bushel, or somewhat less than the fourth part of an English imperial quarter, nine metzen making two quarters nearly. The eimer, the most generally used liquid measure, is equal to 14·94 English wine gallons. The Vienna foot is equal to 12·45 inches English. The joch of land is 1·43 English acre.

Population.—None of the European states, with the exception of Russia, exhibits such a diversity of race and language among their population as does Austria-Hungary. The Slavs, who amount to above 20,600,000, or 45 per cent of the total population, are the chief of the component nationalities of the monarchy in point of numbers, forming the great

mass of the population of Bohemia, Moravia, Carniola, Galicia, Dalmatia, Croatia and Slavonia, and Northern Hungary, and half the population of Silesia and Bukowina. This preponderance, however, is only apparent, as none of the other races are split up into so many branches differing so greatly from each other in language, religion, civilization, manners, and customs. These branches are the North Slavic Czechs, Moravians, and Slovaks, the Ruthenians and Poles, and the South Slavic Slovenians, Croats, Serbs, and Bulgarians. The Germans, about 11,300,000 in number, are scattered over the whole monarchy, and form almost the sole population of the archduchy of Austria, Salzburg, the greater portion of Styria and Carinthia, almost the whole of Tyrol and Vorarlberg, considerable portions of Bohemia and Moravia, the whole of the W. of Silesia, &c.; and they are also numerous in Hungary and Transylvania. The Magyars or Hungarians (8,750,000 in number, or about 19 per cent of the total population) form the great bulk of the inhabitants of the Kingdom of Hungary including the eastern portion of Transylvania. To the Italic or Western Romanic stock belong the inhabitants of South Tyrol and parts of Istria, Dalmatia, and the coasts, numbering about 727,000 in all. A considerable portion of the S.E. of the empire is occupied by members of the Roumanian (or eastern Romanic) stock, who number altogether over 3,000,000, and form more than half the population of Transylvania, besides being spread over the south-eastern parts of Hungary in the narrower sense, Bukowina, and part of Croatia and Slavonia. The number of Jews is also very considerable (above two million), especially in Galicia, Hungary, Bohemia, and Moravia. There are also several other races whose numbers are small, such as the Gypsies, who are most numerous in Hungary, and the Albanians in Dalmatia and neighbouring regions. The population is thickest in Lower Austria, Silesia, Bohemia, and Moravia; thinnest in Salzburg. Generally speaking, it decreases in density from W. to E.

Religion.—The predominant religion both in Austria and Hungary is the Roman Catholic, and next in numbers is the Greek Church; but there is perfect equality among all recognized religions. Calvinism and Lutheranism are also professed by a large body of the people, the former mostly in Hungary, the latter in the German provinces and in Galicia. The civil power exercises supreme control in all ecclesiastical matters, the emperor being, in everything but the name, head of the Church in Austria; and as no sentence of excommunication, or other ecclesiastical edict, can be issued without the sanction of the crown, the pope's direct authority is somewhat limited. In 1900 there were in the Austro-Hungarian territories 20,660,279 R. Catholics, 3,136,535 Greek Catholics united to the Roman Church, 606,764 non-united, 494,011 Protestants, and 1,224,899 Jews. In Hungary there were 9,919,913 Roman Catholics, 1,854,143 Greek united and 2,815,713 non-united, 3,798,652 Protestants, and 851,378 Jews.

Education.—The intellectual culture of the people is at very different stages of advancement in the different divisions and among the different races. It is highest in the German provinces. In Upper and Lower Austria, Salzburg, Tyrol, Moravia, Silesia, and Bohemia, almost all the children of suitable age are in attendance on the public schools; while in Bukowina only about 34, and in Galicia about 59 per cent of them are at the schools. The educational system has been entirely remodelled in recent times. The elementary schools, or those in which the common branches of education are taught, are designated national schools or schools for the people, and there children have to attend from the end of their sixth to the end of their fourteenth (in some provinces only their twelfth) year. A higher class of elementary schools are known as town schools, in which a superior education may be obtained. For the training of instructors for the people's schools, there are many normal schools for male and female teachers. As secondary schools or institutions of a more advanced grade, there are the gymnasia and the 'real-schools', as they are called. The gymnasia resemble the best sort of our grammar-schools, being intended chiefly to prepare pupils for the universities, and great attention being paid in them to the classical languages. In the real-schools a more practical end is kept in view, and modern languages and physical science form the groundwork of the educational course. A complete course in a gymnasium extends over four years, in a real-school either three or four. There are also schools of an intermediate stamp known as 'real-gymnasia'. The higher education is provided for by the universities, the polytechnic institutes, and the various institutions in which particular subjects are taught. There are eleven universities in the dual monarchy, viz. in Vienna, Prague (two—a German and a Bohemian), Budapest, Gratz, Cracow, Lemberg, Innsbruck, Klausenburg, Agram, and Czernowitz. Most of these have four faculties—Catholic theology, law and politics, medicine, and philosophy. There are also a number of technical high-schools in which mathematics, physics, natural science, chemistry, engineering, architecture, &c., are the chief objects of study. Besides these there are theological institutions; schools for jurisprudence and philosophy; schools of commerce, industrial arts, agriculture, arboriculture, and mining; military schools, naval schools; art schools, conservatories of music, &c. The principal libraries are the royal library at Vienna, with 500,000 volumes, 24,000 manuscripts, and 7000 incunabula; and the university libraries of Vienna and Prague.

Constitution, Revenue, Army, and Navy.—As already mentioned, the Austro-Hungarian dominions now consist of a German, or Slavo-Germanic, or Cisleithan empire, and a Transleithan or Hungarian kingdom, each with its own parliament, ministers, and government. The same hereditary sovereign rules over both, and they have a common army and navy, and a sort of common representative body known as the Delegations. The delegations consist of two bodies, each of 60 members, one being chosen by and representing the legislature of German Austria, and the other that of Hungary, the upper house of each legislature returning twenty, and the lower house forty deputies. Practically each delegation is a committee sent by the parliament of its own country to examine into financial matters belonging to the common diplomacy and common army of the two states, and after deciding as to the funds required, to advise that the amount should be voted by the parliament to which it belongs. The delegations have themselves no legislative powers, no decision of theirs is valid till it has been confirmed and adopted by each parliament. The delegations meet alternately in Vienna and Budapest, and their ordinary mode of procedure is to sit and vote in two chambers. But if no agreement can be arrived at in this manner, the two bodies must meet together and without further debate give their final vote. The constitution of German Austria was finally established in Dec., 1867. The provinces have each a diet or legislature of their own for provincial affairs, these diets being sixteen in number, one each for Bohemia, Dalmatia, Galicia, Upper Austria, Lower Austria, Salzburg, Styria, Carinthia,

Carniola, Bukowina, Moravia, Silesia, Tyrol, Vorarlberg, Görz and Gradisca, and Istria, the municipal council of Triest having similar functions. The provincial diets are composed of the archbishops and bishops, the rectors of the universities, the representatives of the great estates, of towns, of boards of commerce, of rural communes, &c. The laws passed in these diets have reference to provincial taxation, agricultural, educational, and other matters. The national parliament or legislature of German Austria, called the *Reichsrath* (or council of the realm), consists of an upper house or house of lords (*Herrnhaus*), and a lower house or house of deputies (*Abgeordnetenhaus*). The former is composed of princes of the imperial family (archdukes, sixteen in number), of nobles whose families have a hereditary right to this dignity, of the archbishops, the bishops of princely rank, and of a certain number of life-members (at present more than 160) nominated by the emperor. The lower house consists of 516 members, elected for six years on the basis of universal suffrage, the voters being all male citizens over twenty-four years. The rights belonging to the Reichsrath are—consent to all laws relating to military service; co-operation in the legislation on commercial matters, customs, railways, &c.; and examination of the estimates of income and expenditure, and other financial matters. The constitution of Hungary, including also Croatia, Slavonia, and Transylvania, rests upon a number of statutes published at long intervals, the principal of these being the *Bulla Aurea* or Golden Bull of Andrew II., granted in 1222, by which the government was defined as an aristocratic monarchy. The legislative power is vested in the king and the parliament or *Reichstag* conjointly. The latter consists of an upper house or house of magnates, and of a lower house or house of representatives. The house of magnates consists of the archdukes of the imperial family who have attained their majority (sixteen in number), 52 ecclesiastical dignitaries, 184 counts, and 41 barons as hereditary members, 68 life-members nominated by the sovereign, or elected by the chamber, &c. The lower house (of 453 members) is composed of elected representatives. The Hungarian Reichstag corresponds to the Reichsrath of the Austrian provinces, and accordingly only deals with such matters as are common to the provinces belonging to the Hungarian crown. Transylvania is, so far as legislation and administration are concerned, entirely incorporated with Hungary. Croatia and Slavonia, however, have a Landtag or diet of their own, which, like the provincial diets of the Austrian portion of the empire, consists of only one chamber, and which is competent to deal with all matters belonging to the interior administration of the provinces, with religion and education, and with the administration of justice. Fiume, which was formerly associated with Croatia and Slavonia, and subject to the Landtag of these provinces, has since Aug., 1876, been put directly under the central Hungarian government.

From the nature of the union between Austria and Hungary there are three budgets. In the budget of the whole empire for 1910 the revenue and expenditure were each estimated at £18,000,000; in that for Austria the revenue was estimated at £113,240,000, and the expenditure at £115,800,000; and in that for Hungary the estimated revenue was £64,800,000, the estimated expenditure being rather more. A small portion of the imperial revenue is derived from customs and other sources, and the remainder is made up by the two divisions of the empire, 63·6 per cent thereof being at present contributed by the Austrian and 36·4 per cent by the Hungarian portion. In 1910 the public debt of the whole empire and the two divisions combined amounted to £600,000,000.

Military service is obligatory on all citizens capable of bearing arms who have attained the age of twenty, and lasts up to the age of forty-two either in the active army, in the landwehr, or the landsturm. The period of service in the active army is twelve years, of which three are passed in the line, seven in the reserve, and two in the landwehr. The standing army numbers about 400,000 men (including officers) on the peace-footing, and 1,540,000 men on the war-footing.

The Austrian navy comprises about 170 vessels of all kinds, including some 12 battleships and several cruisers, some of the former being powerful. The other vessels are mostly torpedo craft. The crews number about 16,500 officers and men.

AUTO DE FÉ. See INQUISITION.

AUTOGRAPH (Greek), a manuscript written by an author himself, or often merely a person's name in his own hand-writing.

AUTOMATON (from Greek, *automatos*, spontaneous), a self-moving machine performing actions like those of a living being. We find very early mention of them. In ancient times Dædalus is said to have made walking statues, and Archytas a flying dove. In modern times Friar Bacon has the reputation of having constructed a brazen head which spoke, and Regiomontanus an iron fly, which, after making the tour of the room, returned to its master. Albertus Magnus, in the thirteenth century, is said to have spent thirty years in constructing a human figure which advanced to the door when anyone knocked, opened it, and saluted the visitor. In the water-clock presented to Charlemagne by Harun al Raschid, twelve doors in the dial opened respectively at the hour which they represented; they continued open till noon, when twelve knights issued out on horseback, paraded round the dial, and then returning shut themselves in again. Camus constructed an ingenious toy for Louis XIV., consisting of a carriage drawn by two horses containing a little figure of a lady with a coachman and attendants. The coachman smacked his whip, the horses moved their legs naturally, and when the carriage arrived opposite to the king's seat it stopped; the page stepped down and opened the door; the lady alighted and presented a petition to Louis. The flute-player, the tambour-player, and the wonderful duck of Vaucanson are celebrated for the astonishing ingenuity displayed in their construction. The two brothers Droz also executed some admirable works of the kind. One of them was a child sitting at a desk, who dipped his pen into the ink, shook it, and wrote in French whatever was dictated to him. In this, of course, human intervention came in. Of all automata among the most remarkable are the whist-playing and other figures of Mr. Maskelyne.

AUTOMOBILE, AUTO-CAR. See MOTOR VEHICLES in SUPPLEMENT.

AUTUMN, that one of the seasons which, in the northern temperate zone, begins when the sun, in its apparent descent to the southern hemisphere, touches the equator. The end of autumn is at the time of the sun's greatest S. declination, or when he enters Capricorn. According to our computation of time the beginning of autumn is September 22 or 23, when, for the second time in the year, the days and nights are equal; and the end is December 21 or 22, at the time of the shortest day. The autumn of the southern hemisphere is during the time of the northern spring. From this astronomical autumn the physical or popular autumn differs according to the climate.—*Autumnal equinox.* (See EQUINOX.)

AUTUN (ancient *Bibracte*, later *Augustodunum*),

a town of France, in the department of Saône et Loire, 28 miles E.N.E. of Châlons-sur-Saône. It derives considerable interest both from its antiquities and from its modern edifices. Of the former the more remarkable are two Roman gates of exquisite workmanship and in good preservation, the ruins of an amphitheatre and of several temples; of the latter the most conspicuous is the cathedral of St. Lazare, a Gothic structure of the eleventh century, with a beautiful zodiac above its principal portal, a choir rich in marble sculptures, and a spire 325 feet high. The manufactures consist of carpets, serge, cotton velvet, hosiery, and a peculiar woollen fabric called *tapisseries de marchands*, used for horsecloths, &c.; the trade is chiefly in grain, wine, wood, hemp, leather, and cattle. Pop. (1906), 14,003.

AUVERGNE, a province of Central France, now merged into departments Cantal and Puy-de-Dôme, and an arrondissement of Haute Loire; but still deserving of separate notice because of its frequent use as a geographical expression, particularly in the numerous works, both popular and scientific, to which its interesting geological phenomona have given birth. The part of Auvergne to which these works specially refer is an extensive plain, usually known by the name of the Limagne, stretching from S. to N. about 50 miles, with an average breadth of 20 miles, and an altitude above the sea of 1200 feet, and bounded, E. and W., by two parallel ranges of gneiss and granite about 3000 feet high. The surface of the plain consists of alluvial deposits resting on a substratum of limestone, and is broken by numerous hills, which appear to have originally formed part of the same substratum, and been upheaved by volcanic agency. The best proof of this is in the fact that many of them are surmounted by a crest or capping of basalt. To the W. of the plain the limestone disappears, and is succeeded by a plateau of granite, which, rising 1600 feet above the valley of Clermont, must be 3000 feet above the sea. This plateau forms the base of a long chain of volcanic cones and domes, which, to the number of 70, form a zone of nearly 20 miles by 2 miles, and vary in altitude from 500 to 4000 feet. The highest of them, Puy-de-Dôme, is 4805 feet above the sea. It is entirely composed of volcanic matter, and has a regular crater 1000 feet in circumference, and 300 feet deep. The whole of the cones present the same general character—well-defined craters inclosed by regular cones, on whose sides the lava currents may be traced as easily as on those of Vesuvius.

AUXERRE (ancient *Antissiodurum*), a town, France, department of Yonne, 96 miles S.E. of Paris, population in 1906, 20,254. It is finely situated on a height above the Yonne, which here becomes navigable, but is very poorly built. Its principal edifices are its cathedral, which though still unfinished is a splendid Gothic structure, with a finely proportioned interior, and windows fitted with the most beautiful stained glass; the abbey of St. Germain, with some curious crypts; and a magnificent old episcopal palace, now converted into the Hôtel de Prefecture. The manufactures consist of woollens, hats, wine casks, leather, red and yellow ochre, earthenware, and violin strings; and the trade is chiefly in wood and in the wines of the district. Of these wines the most famous is the white Chablis.

AUXONNE (Latin, *Asona* or *Aussona*), a town in France, department of Côte-d'Or (Burgundy), 18 miles E.S.E. of Dijon, on the left bank of the Saône, here crossed by a beautiful bridge of twenty-three arches. Auxonne is a fortified place of the second class, well built, the seat of a court of commerce, and has a communal college, and a public library containing 4000 volumes; a castle, an arsenal, and a cannon-foundry. Manufactures—woollen stuffs, serges, muslins, and hardware. Trade—grain, flour, fruit, wine, brandy, iron, wood, and coal. Auxonne was the capital of a small sovereignty separate from the duchy and county of Burgundy, the sovereigns of which took the title of *Sires d'Auxonne*. Pop. 2900.

AVA, or AUNGWA, a town in Asia, formerly the capital of Ava or Birmah, on the Irrawaddy, 6 miles S.W. of Amarapura; lat, 21° 51′ N.; lon. 95° 58′ E. It has a circuit of about 5 miles, and consists of an inner and an outer town, each surrounded by a brick wall. The houses in general are mere huts. Formerly the buildings of the place included a large palace, a court-house or hall of justice, a council chamber, and arsenal; but in 1839 these and almost every substantial building were ruined by an earthquake. The seat of government was then transferred to Amarapura. Ava is now to a great extent deserted; the population only amounts to about 9000.

AVA-AVA (*Macropiper methysticum*), a plant belonging to the natural order Piperaceæ (pepper), so called by the inhabitants of Otaheite, who make an intoxicating juice out of it. Their chiefs vie with each other in drinking the greatest number of draughts, as the German students do in drinking beer.

AVALANCHES (in German *Lawinen*; in the Swiss dialect, *Lauwinen*), large masses of snow which roll down from the mountains, causing great damage by their fall. There are various kinds. The *wind* or *dust avalanches* are so called because they are occasioned by the wind, which carries along the fresh fallen snow, and throws it, in the form of dust, into the valleys. The rapidity with which they come would render this kind the most dangerous of all, were it not for their great lightness, which renders it easy to extricate one's self from them. There have been instances of people remaining twenty-four hours, and even longer, under such avalanches without being suffocated. Another kind are called *mountain* or *snow avalanches*. These are not blown off by the wind, but fall by their own weight, bringing down with them all the ground on which they lie, together with the trees, rocks, &c., which are there. They generally fall in the spring, when the increasing warmth has rendered the snow more damp and heavy, and the water percolating through the snow makes the ground slippery. They are not very dangerous, since their fall is usually not very high, and the places at which they are formed, and the time of their fall, are generally pretty well known. The *sliding avalanches* are formed in spring, and for the most part on the declivities of mountains which are exposed to the sun. The most dangerous avalanches are those which are formed on bare and not very steep mountain slopes surmounting high precipices, over which they are hurled with great violence, as in the Schöllenen on the St. Gothard Road, in the Swiss canton of Uri. Even the wind caused by these avalanches in their descent throws down woods and huts. The *glacier* or *summer avalanches* consist of portions of glaciers which in summer are separated from the ice-masses formed on steep declivities, and which fall with a thundering noise into the valleys. Since they nearly always fall in uninhabited districts they are the least destructive.

AVANTURINE. See QUARTZ.

AVARES, a nation in all probability of Mongolian or Turkish origin, who at an early period migrated to the regions around the Don, the Caspian Sea, and the Volga. A part advanced to the Danube in 555 A.D., and settled in Dacia. They served in Justinian's army, aided the Lombards in destroying the Kingdom of the Gepidæ, and gradually conquered (especially under the powerful Khan Bajan, in the latter half of the sixth century) the region of Pannonia. Under his successors they

made themselves masters of Dalmatia, pressed into Thuringia and Italy, where they fought with the Franks and Lombards, and extended their dominion over the Slavonians dwelling on the Danube and farther N., as well as over the Bulgarians on the Black Sea. But they were soon divided, and ultimately lost Dalmatia. Limited to Pannonia, they were at length overcome by Charlemagne, and their power was finally destroyed by the Slavonians of Moravia. After 827 they disappear from history; but the valley of the Erlav, a small tributary of the Danube in Lower Austria, was called the 'land of the Avares' as late as the tenth century.

AVATAR, or more properly AVATÂRA, in Hindu mythology, an incarnation of the Deity. Innumerable incarnations have taken place, according to the Hindus, but ten are peculiarly distinguished, and four of them are the subjects of *Purânas*, or sacred poems. These ten are among the incarnations of Vishnu, the supreme God. The Matsya avatar was the descent of the deity in the form of a fish; Kachyapa or Kûrma, in that of a tortoise; Varâha, as a boar; Nara-sinha, as a monster, half man, half lion; Vâmana, as a dwarf; Parasurama, as the son of Jamadagni. All these took place in the *Satya Yuga*, or golden age. The others are more recent. The seventh incarnation was in the form of the four sons of King Dasaratha, under the names of Râma, Lakshmana, Bharata, and Satrughna, in order to destroy certain demons that infested the earth. The achievements of Râma are the subject of the celebrated epic called the Râmâyana. The eighth avatar of Vishnu, in the form of Krishna, is the best known of all, from the fact that it forms the subject of the great Sanskrit epic poem the Mahâbhârata. Its object was to relieve the earth from the Daityas, and the wicked men who oppressed it. The ninth was in the form of Buddha. The Kalki, or tenth avatar, is yet to come at the end of the *Kali Yuga*, or the iron age. See VISHNU.

AVEBURY, a village in Wiltshire, 6 miles from Marlborough. It is noticeable as occupying the site of an ancient Druidical temple, which originally consisted of a large outer circle of 100 stones, from 15 to 17 feet in height, and about 40 feet in circumference. It was surrounded by a broad ditch and lofty rampart, and inclosed within it were two smaller circles, each consisting of a double concentric row of stones, with a stone pillar in the centre of the one, and a cromlech in that of the other. Few traces now remain of this curious structure, which has been largely made use of in the construction of the houses of the village. On the neighbouring downs are numerous barrows or tumuli, one of which, called Silbury Hill, is a conical eminence rising to the height of 130 feet, with a circumference of 2027 feet at the base, and covering an area of upwards of five acres.

AVEBURY, LORD. See LUBBOCK in SUPP.

AVEIRO, a seaport of Portugal, in the province of Beira, on the railway from Lisbon to Oporto, 40 miles from the latter. It stands on the shore of a large coast lagoon, from which much salt is obtained, and it carries on an important sardine fishery, as well as a trade in oil, wine, and oranges. It is the see of a bishop, and has a cathedral. Pop. (1900), 10,012.

AVELLINO, a town in the Kingdom of Italy, capital of the province of Avellino or Principato Ultra, 29 miles E. of the city of Naples. It is a fortified place, and the seat of a bishop, suffragan to Benevento. It has a square adorned with an obelisk, and possesses several agreeable promenades; but the public edifices, with the exception of a granary, are of the poorest description. It has some manufactories of maccaroni, of sausages, long celebrated, and of coarse cloth; it has also several dyeworks, and is famed for its confectionery. The neighbourhood abounds in chestnuts and hazel-nuts. The latter were much prized by the Romans, and are still celebrated under the name of Avellino nuts. Pop. (1901), 23,790.

AVE MARIA, among the Roman Catholics the beginning of a prayer to the holy virgin, whence the whole prayer is called *Ave Maria*. *Ave* in Latin means hail. Ave Maria! is Hail Mary! It is the beginning of the salutation which the angel addressed to the Virgin, as he announced to her that she should be the mother of the Saviour (Luke i. 28: 'Hail, highly favoured, the Lord is with thee; blessed art thou among women'). The name Ave Maria is also given to those little balls in rosaries, each of which denotes a prayer, called Ave Maria (see ROSARY); while the larger balls denote a Paternoster. As in Italy a bell tolls at sunset which admonishes the people to address their prayers to the queen of heaven, the close of the twenty-fourth hour, which, according to the Italian division of time, coincides always with sunset, is called Ave Maria; and it is usual to say, 'at Ave Maria,' 'half-past Ave Maria,' &c., instead of at twenty-four o'clock, half-past twenty-four, &c.

AVENA. See OAT.

AVERAGE. In case of shipments of goods, the bills of lading often contain a stipulation that the shipper shall, besides a certain rate or amount of freight money, also pay 'primage and average.' The word *average* in this place originally denoted several petty charges, such as towage, beaconage, &c., which are to be borne by the ship, freight, and cargo, the kind and amount of which are very various, being determined by the marine ordinances of some countries, and in others by the usage of particular ports. There is often a great variety in the usages at the different ports of the same country in this respect. But the practice has now become general, to allow a certain rate per cent. on the amount of the freight for primage and average, where the bill of lading provides for the payment of these. Average, *general* or *gross*, consists of expenses incurred, sacrifices made, or damage sustained during a voyage for the common benefit of ship, freight, and cargo, and comprehends jetson (the loss sustained by throwing overboard a part of the cargo, or of the provisions, tackle, or furniture of the ship, for the general safety), or the cutting away of a mast, and also ransom paid to pirates, compromise with captors (if permitted by the laws), the damage occasioned by purposely running the vessel on shore, and by the usage of some countries, the expense of getting a stranded vessel afloat, though it was accidentally stranded, and the expenses of delaying the voyage to seek a port to refit. The expenses and damage that are the subjects of contribution in general average, must be divided among all the parties to whom the ship, freight, and cargo belong, in the proportion of their several interests. Contribution for jetson was provided for in the maritime laws of Rhodes, and thence adopted into the Roman code.—Average, *particular*, is the loss, expense, and damage sustained on a ship, freight, or cargo, which is to be borne by the party to whom the interest belongs, without any claim upon the other interests for contribution, and, in general, comprehends loss or damage that happens accidentally, and is not incurred voluntarily and purposely. A policy of insurance generally covers both general and particular average, unless specially excepted.

AVERNUS, a lake, now called *Lago d'Averno*, in Naples, Kingdom of Italy, between the ancient Cumæ and Puteoli. It is circular, in some places 180 feet deep, and surrounded by hills of a moderate height, which used to be covered with immense woods, so

that it had rather gloomy surroundings, while the atmosphere was charged with unhealthy mephitic effluvia. It occupies the crater of an extinct volcano, and is over a mile and a half in circumference. Agrippa opened a communication between this lake and the Lucrine Lake, so as to render it accessible to ships; but this state of matters did not long continue. By ancient Greek writers, subsequent to Homer, it was fabled to be the entrance to the infernal regions, and to have been the place where Ulysses entered in his visit to the shades. It was also thought that the Cimmerians of Homer dwelt on the banks of this lake. The sibyl of Cumæ is said to have had her grotto here, and Virgil represents her as guiding Æneas when he made his descent (*'facilis descensus Averno'*) to the infernal regions at this place.

AVERROES (corrupted from *Ebn* or *Ibn Roshd*), the most renowned of the Arabian philosophers, and instructor of Moses Maimonides, was born at Cordova, in Spain, in 1126. His father and grandfather had held judicial appointments, and he became a cadi or judge first in Seville and afterwards in Cordova. By his friend Ibn Tophail he was introduced to the Caliph Jussuf, whose personal physician he became, and he also enjoyed for a time the patronage of his successor Almanzur. He was appointed cadi in the province of Mauretania; but his success was envied, and he was accused of rejecting the established religion, and in consequence deprived of his offices, and banished to Spain. He returned to Cordova, where he was assisted by his scholar Maimonides; but was soon persecuted there also, and fled to Fez. Here he was condemned by a spiritual court to recant and undergo a public penance. Upon this he went back to his own country, but was latterly restored to his dignities in Marocco. He died, after an active life, at Marocco, most probably in 1198. Averroes regarded Aristotle as the greatest of all philosophers, and explained his writings, with only a slight deviation from his views. The Alexandrian doctrines also had much influence upon him. Against the Orthodox Arabians, particularly against Algazzali, he set himself up as a defender of philosophy on rational principles. To the later schoolmen he became, through Latin versions, the interpreter of Aristotle, and for a considerable time Averroism held an important place in the history of philosophy. Besides commentaries on Aristotle and other philosophical works he wrote also a compendium of physic, called Colliget (a corruption of the Arabic 'Kulliyat', or summary), and treatises on jurisprudence, astronomy, grammar, &c. His commentaries upon Aristotle, in a Latin translation, were repeatedly printed at Venice in the fifteenth and sixteenth centuries. His Colliget also was early translated into Latin, and several times printed. A great part of his writings still remain in manuscript. Compare Renan's Averroës et l'Averroisme (Paris, 1860), and Müller's Philosophie und Theologie von Averroës (Munich, 1875).

AVERSA, a town of Italy, in the province of Caserta or Terra di Lavoro, 9 miles N. of Naples, on a delightful plain, covered with vines and orange-trees. It is a lively place, the seat of a bishopric, and contains among its other institutions a well-conducted foundling hospital, and a lunatic asylum. Aversa is famed for a kind of almond-cake, called *torrone*, which is in great demand at Naples. Andreas of Hungary, husband of Queen Joanna I., was strangled in a convent here, Sept. 18, 1345. Pop. (1901), 23,477.

AVEYRON, a department in the south of France, formed of the ancient district of Rouergue, a subdivision of the province of Guienne. It is one of the most mountainous departments of France; traversed in the E. by branches of the La Margeride range, which unites the mountains of Auvergne with the Cevennes, its boundary on the S.E. Prolongations of the latter, and of the mountains of Cantal, cover the S. and N. parts, one chain, the Aubrac range, extending nearly 30 miles. They are all of volcanic origin, and contain numerous grottoes and subterranean caves. Five considerable rivers traverse the department—namely, the Aveyron, after which the department is named, the Viaur, the Truyère, the Lot, and the Tarn. Of these, the only one navigable within the department is the Lot. During winter, which continues more than six months, the snow lies deep upon the mountains, the sides of some of which are covered with vast forests, principally of chestnuts. It is only in the W. that plains of any considerable extent are found. Agriculture is in a very defective state, but considerable attention is paid to sheep-breeding. Cheese of an excellent quality is made and exported in large quantities. Aveyron possesses valuable coal, iron, and copper mines, besides other minerals. It is divided into five arrondissements, Rodez, Espalion, Millau, Saint-Affrique, and Villefranche. Area of the department, 3376 square miles; capital, Rodez. Pop. in 1886, 415,826; in 1896, 389,464; in 1906, 377,299.

AVIARY, some sort of large inclosure in which birds are kept, especially as objects of interest, and not for profit. The aviary was common in the country-houses of the Romans, but used principally, as it would appear from Pliny, for birds destined to be eaten. Singing-birds, however, were kept by the Persians, Greeks, and also the Romans, in wicker-cages; and the use of these, no doubt, gave rise to the large and fixed cage or inclosure called an aviary. Aviaries have long been known in China. That they were in use in England in Evelyn's time is evident from a memorandum entered in his diary, that the Marquis of Argyle took the parrots in his aviary at Sayes Court for owls. In the larger aviaries, in addition to houses for the different sorts of birds, a wire netting is thrown over growing trees, and supported by light posts or hollow rods, so as to inclose a few poles or even acres of ground and water in various forms. In this the birds in fine weather sit on the trees or stroll on the ground, while the aquatic birds sail on the water; and in severe weather they may betake themselves to their respective houses or cages. Such an inclosed space will of course contain evergreen as well as deciduous trees, rocks, reeds, aquatic plants, grass and green-sward, bushes of various kinds for cover and nest-building, &c. Extensive aviaries are often formed in connection with zoological gardens.

AVIATION. See AERONAUTICS.

AVICENNA, or EBN-SINA, an Arabian philosopher and physician, was born near Bokhara, A.D. 980. He received the elements of his education at Bokhara, where he exhibited great precocity. He read the Metaphysics of Aristotle forty times, however, without understanding it, but at last got enlightenment from a commentary bought by chance. He completed his studies at the early age of eighteen, and began to practise as a physician. Having lost his father at the age of twenty-two, he quitted Bokhara, and for a number of years led a wandering life, seldom remaining long at any place he visited, although he was generally received with distinction wherever he went. At last he settled at Hamadan, at first as physician to a noble lady, afterwards as vizier of the emir. On the death of his patron his son and successor refused to recognize him as vizier, and accordingly he lived in retirement at Hamadan, and applied himself diligently to writing various

works. Having secretly offered his services to the Sultan of Ispahan, he fell under the suspicion of the Emir of Hamadan, who put him in prison; but having managed to make his escape, he fled to Ispahan, where the sultan received him with great honour. Here he passed in quietness the last fourteen years of his life, and composed the greater part of his works on medicine, logic, metaphysics, astronomy, and geometry. He died during an expedition of the sultan against Hamadan in 1037, his constitution, originally robust, having been ruined by his licentious life. Avicenna left many writings, mostly commentaries on Aristotle. Of his medical works, the principal is called Canon of Medicine, which is founded on the Greek writers, and in some parts of the East is still an authority. It has been printed in the original Arabic, and there have been many Latin translations of it. His other works have also appeared in translations.

AVIGNON (ancient *Avenio*), capital of the French department Vaucluse, stands on the left bank of the Rhone, is of an oval form, inclosed by lofty battlemented and turreted walls, the ramparts of which are finely planted, and consists generally of large antique houses, arranged in narrow, crooked, dirty streets. The principal objects of interest are the large and very ancient cathedral, with a beautiful chapel, regarded as a masterpiece; the papal palace, with lofty massive walls and strong towers, and the chamber of the Inquisition, with its atrocious appurtenances. The silk manufacture is the principal source of employment at Avignon, and the rearing of silkworms is carried on extensively in the district. The city has also manufactories of velvet, woollen and other goods, hats, jewelry, &c., with silk dye-works, paper-mills, tanneries, &c., and a trade in wine, brandy, iron, cotton, wool, grain, and other articles, of which it is the entrepôt for Lower Dauphiné, Provence, and all Languedoc. Here Petrarch lived several years; here he saw his Laura, who formed the subject of his most beautiful verses, and whose tomb is still to be found in the Franciscan church. The fountain of Vaucluse is five leagues from Avignon. This city and its district, in the middle ages, was a county which Pope Clement VI. bought of Joanna, queen of Sicily and countess of Provence, in 1348, for 80,000 florins. Avignon was subsequently several times taken by the French, and held for short periods, but with these interruptions it was retained by the papal government under the rule of a vice-legate, till 1791, when it was formally united to the French Republic. At the Peace of Tolentino in 1797, the pope renounced Avignon and Venaissin, which had been for even a longer period in the possession of the popes. From March 1309 to Sept. 1376, seven popes in succession, from Clemens V. to Gregory XI., were compelled to reside in this city. The Catholic historians commonly call this period *the Babylonish captivity of the popes*. Near Avignon are found many Roman antiquities. Pop. (1906), 48,312.

AVOIRDUPOIS (French *avoir du poids*, to have weight), a system of weights and measures in which a pound contains 16 ounces, and is in proportion to a pound troy as 17 to 14. All the larger and coarser commodities are weighed by avoirdupois weight. The avordupois ounce is less than the troy ounce in the proportion of 72 to 79.

AVON, the name of several rivers in England, the most important of which are the following four:—1. The Upper Avon, rising in Leicestershire, runs S.W., and falls into the Severn at Tewkesbury. Stratford-on-Avon, a town on this river, is the birthplace of Shakspeare. 2. The Lower Avon, which rises near Tetbury, in Gloucestershire, and falls into the Severn N.W. of Bristol, being navigable as far as Bath. 3. In Monmouthshire. 4. In Wiltshire and Hampshire, enters the English Channel at Christchurch Bay, in the latter county.

AVRANCHES (ancient *Abrincæ*), a town, France, department La Manche, about 3 miles from the Atlantic, and 30 miles E. of St. Malo. It is pleasantly situated at the end of a long ridge, the summit of which was crowned by a magnificent cathedral, which was built in the eleventh century, and destroyed at the revolution. In this cathedral Henry II. did penance before two of the pope's legates for the murder of Thomas à Becket. One of its bishops was the celebrated Huet, author of the Demonstratio Evangelica. The manufactures are chiefly lace, white thread, and wax candles, and there is some trade in agricultural produce. Pop. (1901), 7361.

AWE, one of the Scottish lakes in Argyleshire, forming a narrow expanse about 28 miles long by only 2 miles broad, and communicating by the Awe with Loch Etive. It is of great depth, has sloping and well-cultivated shores, which are terminated by ranges of lofty mountains, among which that of Ben Cruachan, at its northern extremity, is most conspicuous. A number of islets are scattered over its surface, and on two of them are some beautiful ruins.

AXEL. See ABSALOM.

AXINITE, a crystallized substance, found at several places in Cornwall and Devonshire, and in various parts of the Continent. The colours are generally brownish. Its name is derived from the form of the crystals, the edges of which bear some resemblance to the edge of an axe. Axinite is a silicate of alumina, lime, &c., with boracic acid.

AXIOM (an assumption), a universal proposition, which the understanding must perceive to be true as soon as it perceives the meaning of the words, though it cannot be proved. It is therefore called a *self-evident truth*. To these propositions belong, indisputably, those in which the subject and predicate are either the same or are only expressed in different words, since we cannot think a thing as really different from itself: for instance, *A* is *A; Every quantity is like itself; A thing is like itself*. In mathematics axioms are those propositions which are assumed without proof, as being in themselves independent of proof, and which are made the basis of all the subsequent reasoning. Euclid has assumed fifteen axioms as the basis of geometry. Among these are: 'The whole is greater than its part;' 'Things that are equal to the same thing are equal to one another;' 'Magnitudes which coincide, that is, which exactly fill the same space, are equal to one another in every respect.' Bacon calls axiom a general principle, obtained by experiment and observation, from which we may safely proceed to reason in all other instances; and Newton gives the name of axiom to the laws of motion, which, of course, are ascertained by the investigation of nature; he also terms axioms those general experimental truths or facts which form the ground-work of the science of optics. Dugald Stewart thinks that, in this and other instances, Newton followed Bacon's phraseology 'too implicitly.'

AXIS, in geometry, the straight line which divides the area of a curved figure (for example, of a circle, ellipse, &c.) into two parts, similar and similarly situated, on both sides of the line. Further, a straight line drawn from a point in the periphery through the centre of a sphere is its axis; and a straight line drawn from the vertex of a cone through the centre of its base is the axis of the cone.—The *axis of the world* is the imaginary line drawn through its two poles.

AXMINSTER, a market town, England, county Devon, 24 miles E. of Exeter, on the S.W. side of a hill that rises above the river Axe. The only public

building worthy of notice is the parish church, a very ancient edifice, containing some interesting antique monuments. Axminster was at one time celebrated for its woollen cloth and carpet manufactures, and gave name to a special make of carpet having a thick soft pile. (See CARPET.) Brushes are now made here, and there are corn and other mills. Pop. of par. (1901), 3853.

AXOLOTL, a remarkable animal, which was formerly believed to form one of the group of amphibians called perennibranchiate batrachians, that is, which retain their gills through life and not merely during the larval stage. The specimens generally obtained, however, so strongly resemble a sort of aquatic salamander, when the latter is about to lose its gills and pass to its perfect state, that many believed it to be only a salamander in its early stage. This view was confirmed when a number of specimens in an aquarium in the Paris Zoological Gardens were observed to lose their gills and the crest on the back, and to undergo certain other changes, by which these animals acquire so complete a resemblance to the members of the amphibian genus Amblystoma that the axolotl has now been placed in this genus as *A. tigrinum*. It is an undoubted fact that in its native waters the axolotl does not lose its gills, and even breeds freely with its gills on; but it is also known that according to surrounding conditions the young—whether of the amblystoma or axolotl—may or may not lose the gills, and thus take the form either of axolotls (with gills) or of amblystomas (without them). The axolotl is from 12 to 14 inches long, of slaty-gray colour, sometimes brownish, with a deeper shade above, and covered over with small black spots. After its metamorphosis it is covered with yellowish-white spots. It abounds in the lakes in the vicinity of the city of Mexico and those of much greater elevation among the mountains, and is esteemed a luxury by the Mexicans. (See plate at article BATRACHIANS.)

AXUM, a town in Tigré, a division of Abyssinia, once the capital of a powerful kingdom. Neither Herodotus nor Strabo mentions Axum, though in the first century after Christ it was repeatedly spoken of, and particularly after the time of Ptolemy, as the chief city of an important kingdom, which, through Adulis, was connected with Arabia and Ethiopia. Axum was at one time the great depot of the ivory trade in the Red Sea. The importance of this city and its kings was first made known to us by a stone (*Axumitic marble*) with a Greek inscription, first explained by Salt, who discovered it, and afterwards by Buttmann and Niebuhr. This inscription, like similar ones that have since come to us from that quarter, contains an account of the clemency of one Aizanas (a boasting king who called himself a son of Mars) towards several inferior kings whom he conquered. The interest in this inscription was increased by the explanation which it afforded of the second half of the Adulian marble. (See ADULE.) Axum, the place where it was found, still exhibits many remains of its former greatness. Among its ruins are shown the royal throne, and groups of obelisks, originally fifty-five in number, one of which Salt declared to be the most beautiful that he had seen. Modern Axum is a place of 5000 inhabitants, including many priests and monks, and is accounted sacred.

AYACUCHO, the name of a department of Peru and also of its capital. The department has an area of about 24,000 square miles, and a pop. of 302,500. It is traversed by both chains of the Cordilleras and watered by numerous rivers. It produces coffee, sugar, cotton, &c. The capital is situated on the main road from Lima to Cuzco, and has a cathedral and a university. It was founded by Pizarro in 1539, and long known as Huamanga. A battle took place here, one of the most celebrated in the history of South America, having been decisive of the independence of Upper and Lower Peru. For several months before this event the Colombian auxiliary army under General Sucre, and the royalist army under the Viceroy La Serna, had been moving in face of each other with various success, but, on the whole, to the disadvantage of the Colombians. At length a pitched battle took place on the plain of Ayacucho, Dec. 9, 1824, terminatiug in the total defeat of La Serna, who was taken prisoner, with the loss of 1800 men. This victory effectually accomplished the delivery of Peru from the Spaniards. See PERU, BOLIVIA, SUCRE. Pop. of town, 20,000.

AYALA, LOPEZ DE, Spanish historian and poet, born 1332, died 1407. He was a prominent statesman and warrior during the reigns of the Castilian kings Pedro the Cruel, Henry II., John I., and Henry III., being latterly grand-chancellor and high chamberlain. He is known as the author of a Chronicle of the Kings of Castille (his contemporaries), in which the crimes of Pedro the Cruel are minutely detailed and drawn in colours which are said to be sometimes overcharged. Ayala was not contented with thus displaying his zeal in the cause of his master Henry II., the competitor of Pedro, but took an active part in the struggle, and fought valiantly for him. Ayala was a contemporary of Froissart, and bears in several respects a striking resemblance to him.

AYAMONTE, a seaport town, Spain, province and 80 miles W.S.W. of Huelva, on the left bank and near the mouth of the Guadiana, which here forms the boundary between Spain and Portugal. It stands on an acclivity which slopes from N. to S., and is defended by two small batteries of modern construction. The chief employment is fishing. Pop. (1887), 6585; (1897), 7503.

AYE-AYE (*Cheiromys Madagascariensis*), an animal, so called from its cry, a native of Madagascar, considered to belong to the Lemur family. It is a nocturnal animal, about the size of a hare, has large eyes, large flat ears, long sprawling fingers, the third so slender as to appear shrivelled, and a bushy tail. It feeds on grubs, fruits, &c. Its colour is musk-brown, mixed with black and gray ash.

AYESHA, daughter of Abu-Bekr, the favourite wife of Mohammed, the Arabian prophet, though she bore him no child, born in 610 or 611. After his death she opposed the succession of Ali, raised an army against him, and was taken prisoner, but dismissed with that spirit of chivalry which had already arisen among the Arabians, and communicated itself afterwards to the Christians. She died in 677 or 678 (A.H. 58).

AYLESBURY, a market town and formerly a parl. borough of England, the county town of Buckinghamshire, 38 miles by road north-west of London, almost in the centre of the county, and in the centre of the fertile valley of Aylesbury. It has branches connecting it with the Great Western and North Western main lines of railway, besides being on the main lines of the Great Central and Metropolitan railways. There are many old houses, irregularly but picturesquely built. The town is well supplied with water from the Chilterns, and was sewered and drained in 1875. The parish church of St. Mary is a fine old Early English edifice; there are two district churches and various other places of worship; the county-hall, the market-house, the clock tower, and the corn exchange are handsome buildings. There are a literary institution, reading-room, and library; baths; a large county hospital, and numerous minor charities. The chief industries are printing, making condensed milk, and poultry-rearing for the

London market, and there are several breweries and flour-mills. Previous to the Redistribution of Seats Act (1885), Aylesbury and its hundred returned two members to Parliament; it now gives name to a parl. div. of the county (pop. 58,500). Pop. of town in 1881, 7795; in 1891, 8680; in 1901, 9244.

AYR, a river of Ayrshire, which runs a course westward 18 miles, intersects the district of Kyle, and finally loses itself in the Frith of Clyde below the town of Ayr.

AYR, a royal and parliamentary burgh, and capital of Ayrshire, is situated on the southern bank of the river Ayr, near its confluence with the Frith of Clyde. It is distant 76 miles W.S.W. of Edinburgh, and 34 S.S.W. of Glasgow. The place has been inhabited from a remote antiquity. It was the site of a Roman station, and it is generally understood that a hamlet remained here up to the reign of William the Lion in 1197, who greatly increased its importance by the erection of a new castle. About the year 1202 William constituted the town a royal burgh. The celebrated Wallace here performed some of his patriotic exploits, and a strong garrison was placed in the town by Edward I. The tower of the ancient church of St. John, where a parliament sat and confirmed Robert Bruce's title to the crown, and which Cromwell converted into a citadel, still remains; but there are no traces of the old castle except the mound whereon it stood. The principal streets of modern Ayr are spacious and well paved, and many of the buildings handsome; few provincial towns can boast of anything finer than Wellington Square. The most important edifices are several churches of the various denominations; the town-hall and connected offices, in great part completed in 1881 (at a cost of £30,000), but surmounted by a fine spire of older date, 226 feet in height; the county buildings; the academy, a celebrated educational institute, the buildings of which are handsome and commodious; the Wallace tower, 115 feet high on the site of a more ancient tower; the free library; the railway station and hotel; a hospital; &c. There is a handsome esplanade along the sea front 1500 yards long. Two bridges connect Ayr with Newton and Wallacetown, both on the right bank of the river, and incorporated in the burgh. One of these bridges, opened in 1879, occupies the place of the 'New Brig' of Burns's 'Brigs of Ayr' (which according to poetic prophecy had become 'a shapeless cairn'), the 'Auld Brig' (built 1252) still standing after considerable repairs. There is now also a third bridge farther up the river, besides the railway bridge. As a seaport Ayr exports manufactured goods, iron, coal, whetstones, &c.; and imports iron-ore, grain, timber, slates, bricks, &c. The harbour lies within the mouth of the river, and is enclosed and protected by a north and a south pier and a breakwater; there being also a wet dock and a slip dock. Ship-building is carried on, also tanning, boot and shoe making, the manufacture of carpets, lace curtains, &c. The poet Burns, as is well known, was born in a house which stands within 1½ mile of the town, between it and the church of Alloway ('Alloway's auld haunted kirk'), and a monument has been erected to his memory on a height between the church and the bridge over the Doon. Pop. in 1881, 20,812; in 1891, 25,213; in 1901, 29,101.

AYRSHIRE, an extensive maritime county on the south-west coast of Scotland, having somewhat of a crescent form, bounded on the north by Renfrewshire, south by Wigton and Kirkcudbright, east by the shires of Lanark and Dumfries, and west by the Irish Channel. It is about 60 miles in length, measured in a direct line from its most northern to its most southern point, with a breadth varying from 10 to 26 miles, but diminishing to 4 or 5 miles at its north and south extremities. Its coast line, which is about 75 miles in length, presents no deep indentations, but has several excellent harbours. The singular rock off the coast, known by the name of Ailsa Craig, belongs to the county, as also do one or two other islets. Ayr is usually divided into the three districts of Carrick in the south, Kyle in the middle, and Cunningham in the north. The surface is irregular, and a large portion of it hilly. Of the latter description is the whole district of Carrick, the east part of Kyle, and the north extremity of Cunningham. The other parts of the county are in general flat, but the banks of the streams are remarkable for their picturesque beauty. The surface has no great elevations, the highest summits varying from about 1200 to 1900 feet. The principal streams are the Ayr, Stinchar, Girvan, Doon, Irvine, and Garnock, some of which have been rendered classic by the muse of Burns.

The mineral riches of Ayrshire are very considerable, although in part but of recent development. Coal is abundant, especially in the middle and northern parts of the county, and there are over 100 collieries. Extensive seams also of blackband ironstone exist, and are now being actively worked, Ayrshire having become the great seat of the iron manufactures of Scotland next to Lanarkshire. The principal ironworks already established in the county are those of Glengarnock, Eglinton, Muirkirk, Lugar, Stevenston, and Dalmellington. There are over 40 blast-furnaces in the county, the total for Scotland being about 150. Plumbago is found in some localities; and lead, antimony, and copper are also met with. Limestone and freestone abound. Millstones, of coarse granite, much esteemed for their hardness and durability, are quarried near the north coast, in the district of Cunningham. The well-known whetstone, called *Water of Ayr hone*, is found in the river Ayr. Marl also is procured in many places.

The agriculture of the county was in a miserable condition till about the middle of the eighteenth century, when it began to improve, and has since continued to make rapid progress. Of the whole area of the county, which is 730,947 acres, over 320,000 acres are permanent pasture, exclusive of about the same area of mountain and heath land used for pasturage. The principal grain raised is oats, which occupy more than seven-eighths of the total area under cereals. Potatoes and turnips are the most important green crops. Besides these, rye, pease, mangold, carrots, flax, &c., are also cultivated. Dairy-husbandry is extensively practised, the Ayrshire cows being celebrated as milkers. The well-known and much-esteemed Dunlop cheese, so called from a parish of that name in Cunningham, is produced in large quantities; but most part of the cheese made in the adjoining parishes is sold as Dunlop cheese. The Cheddar system of making cheese has also been largely adopted. The native sheep are bred in great numbers; their wool is coarse and scanty, but the flesh is excellent. The horses of Ayrshire are of superior breed, being hardy, strong, and of large size. As already mentioned, iron is manufactured to a great extent; the woollen manufactures are also extensive, particularly carpets, bonnets, and worsted shawls, which are produced in great quantities at Kilmarnock, Stewarton, and other towns. Lace curtains are now also manufactured. Ayrshire needlework is also much esteemed, and has been long known and celebrated under that name; nor is the county less famed for its beautiful wooden snuff-boxes. Among the many interesting monuments of antiquity may be noticed two enormous cairns of gray stones, one in the parish of Galston, the other, the larger of the two, in that of Sorn. On the coast

of Carrick, about 13 miles S.S.W the town of Ayr, is the ancient castle of Turnberry, in which Robert Bruce, king of Scotland, is said to have been born, and where he is known to have spent many of his youthful years. It was here that a fire, accidentally kindled, was mistaken by Bruce for an appointed signal, and caused him to cross the sea from the island of Arran opposite to attempt the deliverance of his country. Dunure Castle, a tall empty tower occupying a commanding position on the coast, about 7 miles S.S.W. Ayr, is also an interesting relic of former times. Of the ecclesiastical ruins the most interesting is the abbey of Crossraguel, founded in 1244. The chief towns are Ayr, Kilmarnock, Irvine, Troon, Saltcoats, Largs, and Ardrossan. North Ayrshire and South Ayrshire each return one member to Parliament. Pop. in 1891, 226,386; in 1901, 254,468.

AYTOUN, Sir Robert, an elegant poet during the reign of James VI., was born in Fifeshire, Scotland, 1570, and studied at St. Andrews. He afterwards resided for some time in France, whence, in 1603, he addressed an elegant panegyric in Latin verse to King James on his accession to the crown of England, which was printed at Paris the same year; and this panegyric had, no doubt, some influence in securing to the author the favour of that monarch, by whom he was successively appointed one of the gentlemen of the bed-chamber, and private secretary to his queen, Anne of Denmark, besides receiving the honour of knighthood. He was at a later period of his life honoured with the appointment of secretary to Henrietta Maria, queen of Charles I. During his residence abroad, as well as at the court of England, he lived in intimacy with, and secured the esteem of, the most eminent persons of his time. He died at London in March, 1638, and was buried in the S. aisle of the choir of Westminster Abbey, where a handsome monument was erected to his memory. The poems of Sir Robert Aytoun, for the first time published together in the Miscellany of the Bannatyne Club, are few in number, but are greatly distinguished by their elegance of diction. Several of his Latin poems are preserved in the work called Delitiæ Poetarum Scotorum, which was printed in his lifetime (1637) at Amsterdam.

AYTOUN, William Edmondstoune, a poet and prose writer, born at Edinburgh of an ancient Scottish family belonging to the county of Fife in 1813; died at Blackhills, Elgin, Aug. 4, 1865. He studied at the University of Edinburgh, and passed as advocate in 1840. His earliest literary productions consisted of contributions to magazine literature. His first independent work was the Life and Times of Richard I., which was published in 1840. In 1848 he laid the foundation of his poetical fame by the publication of a collection of ballads entitled Lays of the Scottish Cavaliers. Many of the ballads in this collection had originally appeared in Blackwood, and when published in a collected form they were received with great favour. This volume, indeed, has continued to be the most popular of all his works, and has passed through numerous editions. It was followed in 1854 by Firmilian, a Spasmodic Tragedy; in 1856 by the poem of Bothwell; and in subsequent years by the novel called Norman Sinclair, and various other original works. In 1858 he performed an important service to the literature of his country by the publication of a critical and annotated edition of the Ballads of Scotland. The translation of the poems and ballads of Goethe which he undertook in conjunction with Theodore Martin was less successful than some of his other works. In 1845 he had been appointed professor of rhetoric and English literature in the University of Edinburgh—a position which he held till his death. In 1852 he was appointed Sheriff of Orkney and Shetland by the government of Lord Derby. In 1854 he became editor of Blackwood's Magazine.

AZERBIJAN (ancient *Media Atropatene*), a province of Persia, between lat. 36° 10′ and 39° 40′ N.; lon. 44° 20′ and 48° 40′ E., and bounded N. by Trans-Caucasian Russia, E. Russia and Ghilan, S. Irak-Ajemi, and W. Kurdistan; length, 260 miles; breadth, 220 miles; area, 25,285 square miles; pop. estimated at 1,500,000. It consists generally of lofty mountain ranges, intersected by deep, rugged ravines, occasionally opening upon plateaux. Near the centre the mountains of Sahend reach 9000 feet, and further E. Mount Sevelan is between 12,000 and 13,000 feet. The principal rivers are the Aras or Araxes on the N., the Kizil-Ozein, which skirts the S., but receives many affluents from the centre; and the Juggaty, with other streams, which discharge themselves within the province into the great salt lake of Urumiyah. Many districts possess great natural fertility, and with the aid of irrigation produce heavy crops of wheat, barley, maize, &c. Fruit is abundant; cotton, tobacco, and grapes grow well; and many horses, cattle, sheep, and camels are reared. The chief minerals are iron, lead, copper, salt, saltpetre, and marble. The inhabitants are Persians, Turks, Armenians, and Jews. The prevailing language is the Turkish. The majority of the population are Mohammedans of the sect of the Shiites, but there is also a considerable body of Nestorian Christians. Tabreez is the capital.

AZIMUTH of a star, the arc of the horizon comprehended between the meridian of the observer and the vertical circle passing through the star. It is easterly if the star is observed before, westerly if after, and zero if at the time of culmination. It is usual to connect with the quadrant a graduated, horizontal circle, called the *azimuth circle*. The zero of its divisions is brought into the situation of the meridian, and we have immediately the azimuth of the star, whose height above the horizon is determined by the telescope of the quadrant.

AZOF, or Azoph, a town in the Russian government of Ekaterinoslav, upon an island at the mouth of the Don, where it flows into the Sea of Azof. It was formerly a strong fortress and a place of extensive trade, but its harbour has become almost sanded up. Pop. 16,791.

AZOF, Sea of (ancient *Palus Mœotis*), an arm of the Black Sea, with which it is united by the Straits of Kertch or Kaffa. Its length, S.W. to N.E., is about 168, its breadth about 80 miles; greatest depth, near its N. side, not more than 8 fathoms. The W. part, called the Putrid Sea, is separated from the main expanse by a long sandy belt called Arabat, along which a military road has been formed. The sea teems with fish.

AZORES, or Western Islands, belonging to Portugal, and situated in the North Atlantic Ocean, between lat. 36° 59′ and 39° 44′ N.; lon. 25° 10′ and 31° 7′ W., are nine in number, and form three distinct groups—a N.W., consisting of Flores and Corvo; a central, consisting of Terceira, São Jorge, Pico, Faial, and Graciosa; and a S.E., consisting of São Miguel and Santa Maria. The total population of the group according to the census of 1900 was 256,615. Administratively, they are divided into three districts, Angra do Heroismo, Horta, and Ponta Delgada. The first comprises the islands of Terceira, Graciosa, and São Jorge, and according to the official calculation, had, in 1900, a pop. of 73,593. The second comprises the islands of Faial, Pico, Flores, and Corvo, with a pop. of 55,456. The third comprises the islands of São Miguel and Santa Maria, with a pop. of 127,566. The whole population of the Azores, in 1881, was

269,401. All the islands are volcanic and subject to earthquakes. The last shocks of earthquake were experienced between the 24th of Dec. 1866, and the beginning of June, 1867. The islands are apparently of comparatively recent origin, usually conical, lofty, precipitous, and of a very rugged but picturesque appearance. The most remarkable summit is the peak of Pico, which rises to the height of about 7600 feet. Viewed at a distance from the sea, they look blasted and barren, but on closer inspection are seen to be covered with luxuriant vegetation, with beautiful woods, corn-fields, vineyards, lemon and orange groves, and rich open pastures. The benign and somewhat humid climate, combined with the natural fertility of the soil, brings all kinds of vegetable products rapidly to perfection. The sugar-cane, coffee-plant, and tobacco grow equally well, and the variety of fruits and plants is almost endless. The lavishness of nature, however, is almost thrown away upon the inhabitants, who are of Portuguese descent, and characterized by the listlessness, indolence, and want of energy and enterprise too common in the mother country. The cultivation of the sugar-cane was once of some importance; sugar is now imported while beet-sugar is made locally. The principal exports are wine and brandy, pine-apples, and lemons and oranges. The island of Pico alone has in many years exported as much as 25,000 pipes of wine. The chief imports are hardware, cotton and woollen stuffs, wearing apparel, &c., from Britain; rum, coffee, and sugar from Brazil; fish and lumber from the United States; and salt, tea, images, and relics from Portugal. The last are in high demand, and form the staple wares of many shops. The first discovery of the Azores is unknown, but they appear in maps of the fourteenth century. Some ascribe their re-discovery to a Fleming named Joshua Vanderberg or Vanderborg, but most accounts agree in stating that they were discovered by Cabral about 1431, and it was shortly after that date that they were taken possession of and colonized by the Portuguese. When first visited by the Portuguese they had no human inhabitants, and scarcely any other animals except birds, particularly hawks, to which, called in Portuguese *açores*, the islands owe their name.

AZTEKS, a tribe which settled in Mexico, made considerable progress in civilization, and ultimately extended their dominion over the whole of the territory included in the modern divisions of Vera Cruz, Oaxaca, Puebla, Mexico, and Valladolid. Their government, at first aristocratical, was in 1352 changed into a monarchy. Their first king was Acamapitzin, but the most celebrated was Motezuma-Ilhuicamina, who flourished about the middle of the fifteenth century, distinguished himself as a legislator, constructed several magnificent works, and made many important conquests. The notions of the Azteks on the subject of religion were very crude; but while worshipping a multitude of inferior deities, they believed in one supreme, absolute, and eternal Being, whom, as being invisible and incorporeal, they never represented either by painting or sculpture. The most revolting part of their religion was the use of human sacrifices.

B.

B, the second letter in all European alphabets, in Hebrew, and most other languages. It belongs to the mutes and the labials, and as all labials are easy to be pronounced, *b* is one of the first letters which children learn to speak, after they utter *a*. The first syllable which they pronounce is generally *ba* or *pa*. The difference in the pronunciation of *b* and *v* is so slight, that in all original languages a considerable period elapses before the two sounds cease to be used indifferently. In some languages *b* continues to be pronounced *v*, under certain circumstances. In the Spanish it has this sound between two vowels in the middle of a word, and generally when it occurs between a vowel preceding and an *r* succeeding it. The modern Greeks pronounce *b* always *v*, and represent our sound of *b* by combining the two letters *μ π*; for example, *Boston* they write *Μποστον*. The languages of the American Indians have few perfect labials, and are therefore spoken with an open mouth, and scarcely any motion of the lips. Another letter into which *b* is often changed is *p*, which requires merely a stronger breathing, with the same motion of the lips. In one part of Saxony the people use *p* and *b* indifferently, and in another part *b* is not used at all. Some languages regularly change *b* into *p* under certain circumstances; as the Latin, when this letter occurs before *p;* thus *ob* is changed into *op* before *ponere* (*opponere*). The German pronounces *b*, at the end of a word or syllable, invariably *p*.—B is often used as an abbreviation, and its common meanings are *before* (as in B.C.), and *bachelor* (as in B.A., B.D., LL.B.) With the Greeks and Hebrews B signified 2; among the Romans, 300; with a dash over it, 3000; and with a sort of accent under it, 200. (See ABBREVIATIONS.)—In music B is the designation of the seventh note in the natural diatonic scale of C. The ancients denoted by B the second interval in their musical scale, beginning with A—the only interval with them which had two chords differing half a note. The lower one was denoted by a small B, the higher one by a large B.

BAAL, a heathen god very generally worshipped by the nations with whom the Israelites chiefly came in contact. We find the name among the Canaanites and the Phœnicians, and on inscriptions that have been collected in the Phœnician colonies, in Cyprus, Malta, Carthage, &c. It is this name that forms the termination of the well-known Carthaginian names Hannibal, Hasdrubal, &c. The worship of the god Baal and the goddess Ashtoreth, or in the plural Baalim and Ashtaroth, is generally understood to have been an adoration of the reproductive powers of nature, including a reference to the two forms in which that power is manifested in animal life—the male and the female. Baal is also regarded as representing the sun or as a sun-god. The offerings made to him were probably in part of vegetable products, but chiefly of animals, and even of human beings, especially children; and he appears to have been sometimes worshipped in a frantic manner and with self-inflicted wounds. We also find repeated mention of incense burned to Baal. The Israelites were often guilty of Baal-worship, and their apostasy from Jehovah reached its height under Ahab. The identity of the Babylonian and Assyrian Bel with Baal is often assumed, but the two seem to have been quite independent.

BAALBEK. See BALBEK.

BAAL-ZEBUB. See BEELZEBUB.

BABADAGH, a town in the kingdom of Roumania, capital of the Dobrudsha. It carries on a considerable Black Sea trade. Pop. 10,000.

BABBAGE, CHARLES, the eminent mathematician and inventor of a calculating machine, was born on the 26th Dec. 1792, at Teignmouth. He was educated first at the Totness grammar-school, then at the private school of the Rev. Stephen Freeman, of Forty Hill, Enfield. Thence he was transferred to Peterhouse, Cambridge, where he became closely associated with Herschel (afterwards Sir John) and Mr. Peacock, then tutor of Trinity College. Being in possession of an independent fortune, Babbage was in a position to devote all his time and energies to his favourite studies—mathematics and mechanics. In 1822 we find him broaching the idea of a difference engine, by which intricate arithmetical calculations could be correctly and rapidly performed. Through the recommendation of the Royal Society he received, in 1823, a grant from government of £1500 for the construction of such a machine. After a series of experiments lasting eight years, and an expenditure of £17,000 (£4000 of which was sunk by the originator of the scheme, the balance voted by government), Babbage abandoned the undertaking in favour of a much more complicated work, an analytical engine, worked with cards like the jacquard loom The government, alarmed at the probable demands, refused to support Babbage in his new adventure, and as a quarrel ensued with his engineer, who withdrew his tools, the pet project was never completed. The machine, along with some 400 or 500 plans, was presented in 1843 to the King's College Museum, London. Among the many treatises he published on subjects connected with mathematics and mechanics, the most valuable and interesting are, On the Economy of Machinery and Manufactures; The Decline of Science; and an autobiographic sketch, Passages in the Life of a Philosopher. In 1828 he was appointed Lucasian professor of mathematics in his university, an office he held for eleven years. In 1832 and 1834 he stood for Finsbury in the Radical interest, but was unsuccessful. He was one of the founders of the Royal Astronomical Society, and a fellow of the Royal Society. He died on the 18th October, 1871.

BABBIT-METAL, a soft metal resulting from alloying together in certain proportions copper, tin, and zinc or antimony. It is used with the view of obviating friction in the bearings of journals, cranks, axles, &c. It was invented by an American goldsmith, Isaac Babbit (1799–1862).

BABEL, TOWER OF, a celebrated structure in the Plain of Shinar, Mesopotamia, commenced by the descendants of Noah subsequent to the deluge, but which was not allowed to proceed to completion. An account of the circumstances relating to its erection is given in the eleventh chapter of the book of Genesis. Among the numerous mounds of rubbish near Hillah on the Euphrates, believed to mark the site of the ancient Babylon, one huge mound, the Birs Nimroud, situated about 6 miles to the S.W. of Hillah, has been generally regarded as the remains of the abortive Tower of Babel. Layard controverted this opinion on the ground that no remains had been discovered here older than the time of Nebuchadnezzar, whose name is inscribed on the bricks of which its masonry is composed. He admitted, however, that the Assyrian monarch may have rebuilt a more ancient structure, and this is the conclusion at which scholars have arrived from the results of fuller investigation. (See BABYLONIA.) Another mound, about 5 miles to the N.E. of Hillah, and which to this day bears the name of Babel, has been assigned by some as the site of the erection mentioned in Scripture.

BABEL-MANDEB, or BABELMANDEL (literally, the *gate of affliction*; anciently, *Dira* or *Diræ*), a narrow strait uniting the Indian Ocean and the Red Sea, formed by projecting points of Arabia in Asia, and Abyssinia in Africa. It is 15 miles wide. In the middle is the island of Perim.

BABER, or BABOUR, SULTAN, the founder of the Mogul dynasty in Hindustan, born in 1483. He was a grandson of the great Tartar Prince Timour, usually called *Tamerlane*, and was sovereign of Cabul. He attempted the conquest of Samarcand, and while engaged in an expedition against it was deprived of his hereditary dominions, and reduced to the utmost extremities, by an invasion of the Uzbeks. After more than once recovering his fortunes, when they seemed to be almost desperate, he invaded Hindustan, and in 1525 overthrew and killed Sultan Ibrahim, the last Hindu emperor of the Patan or Afghan race. Another emperor was chosen to oppose Baber, who, however, overcame the combination against him, and firmly established himself on the throne. After an active and glorious reign, he died in 1530. This prince wrote an elegant history of his own life, a translation of which has been published.

BABEUF, FRANCIS NOEL, one of the numerous individuals, of more zeal than judgment, who distinguished themselves during the French revolution. He was born in 1764, and was left without resources at the age of sixteen by the death of his father. Having been unjustly imprisoned in the citadel of Arras for forgery, he made his escape, and went to Paris, where, in concealment, he published a pamphlet against the Jacobins, entitled, Du Système de Dépopulation, ou la Vie et les Crimes de Carrier. Soon after this he started a democratic journal, called Le Tribun du Peuple, par Gracchus Babeuf. He then wrote with great severity against the Jacobins, and even addressed severe reproaches to the national representatives. After the fall of Robespierre, to which he powerfully contributed, he openly attacked the terrorists, and after the organization of the new government, in 1795, he resumed his journal, and advocated in it the most democratic principles with such energy as to bring on him the vengeance of the ruling powers. He was accused of a conspiracy against the directorial government, tried at Vendôme with some accomplices, declared guilty, and condemned to death in 1797.

BABINGTON, ANTHONY, a R. Catholic gentleman of Derbyshire, who associated with others of his own persuasion to assassinate Queen Elizabeth, and set Mary, queen of Scots, at liberty. The plot being discovered by Walsingham, the conspirators were executed in 1586. Babington seems to have been principally induced to this rash conspiracy by a romantic hope that Mary, in gratitude, would accept of him as a husband.

BABOON, a common name applied to a genus of monkeys, natives of Africa. This genus is the Cynocephalus or dog-headed monkey of modern naturalists, and is divided into two sub-genera, well characterized by the difference of their tails; the first is the *baboon* proper, having the tail longer than, or nearly as long as, the body, and continuous with the dorsal spine; the second, named *mandrill*, is characterized by a short, slender, and pig-like tail, placed perpendicular to the dorsal spine. These are sometimes considered as independent genera, the baboons proper being put in the genus *Cynocephalus*, the mandrill in the genus *Papio*. They are admirably adapted for their mode of existence, and a study of their natural habits would probably modify the disgust with which they are regarded in captivity. The most striking pecu-

liarity of the baboons is the elongated, dog-like head, with its flat, compressed cheeks, projecting and strong teeth, and forehead depressed below the level of the superior margins of the orbits. Notwithstanding this close approximation to the shape of the dog's head, the form and position of the eyes, combined with the similarity of the arms and hands, give to these creatures a resemblance to humanity as striking as it is disgusting. The whole aspect of the animal impresses the beholder with an idea of great physical strength, united with a temper at once incorrigibly vicious and brutally ferocious. Such is the true character of the baboons, capable of being ruled only by the severest treatment. Left to their own will, their savage nature immediately resumes its sway, and their actions are gratuitously cruel, destructive, and disgusting. In the vicinity of the Cape of Good Hope, where a species of baboon called the Chacma or Ursine baboon (*Cynocephalus porcarius*) is found in considerable numbers, the inhabitants wage war against them, on account of the ravages they commit in the fields and gardens. They make a very obstinate resistance to dogs, and only retreat before men when armed with guns. They feed exclusively on fruits, seeds, and other vegetable matter, and display a great deal of cunning and audacity when engaged in their marauding expeditions. This animal has the remarkable instinctive power of being able to detect the presence of water, and in South Africa is often employed for this purpose when the ordinary water supply fails. The baboon can never be called *tamed*, however long his confinement may have endured. As he advances in age he grows dangerously savage, and slight causes provoke him to terrible fury. (See plate at article Ape.)

BABOUR. See Baber.

BABRIUS (full name probably Valerius Babrius), a Greek poet, believed to have lived at the court of the emperor Severus, A.D. 222–235. He turned a number of fables similar to those of Æsop into choliambic verse. For a long time only a small portion of this work was known, but in 1840 a manuscript containing 120 fables previously unknown was discovered on Mount Athos. An edition of the work was soon after published by Lachmann (Berlin, 1845), and another was published in England. The best edition is that of W. Gunion Rutherford (London, 1883), with valuable commentary, dissertations, &c.

BABYLONIA (now *Irak Arabi*), an old Asiatic empire, bounded E. by Susiana, S. by the Persian Gulf and Chaldea, W. by Arabia Deserta, and N. by Media and Armenia, or Mesopotamia. As the Chaldeans had possession of the whole country, it was also included under the name *Chaldea*. It is a level region, watered by two great rivers, the Euphrates or Frat, and the Tigris. The former stream, which is almost always on a level with its low banks, overflows on the slightest occasion. It inundates the whole country every spring, when it is swollen by the waters from the Armenian mountains, and fertilizes it as the Nile does Egypt. Nature has supplied the want of wood and stone by clay, which, when dried in the sun or burned in furnaces, makes durable bricks, that even to the present time have resisted the effects of the climate in the ruins of the ancient city. For mortar the inhabitants use bitumen, of which there are copious springs.

The extent of the old capital, Babylon, situated on the Euphrates, according to the representations of the ancients, approaches the miraculous. The walls are said to have been 350 feet high and 87 feet thick; to have had 250 towers, and 100 gates of brass, and to have been more than 60 miles in circuit. The Temple of Belus and the hanging gardens were among the greatest curiosities of this gigantic city, of which few traces remain. The earliest known inhabitants were called Akkadians or Sumerians, and were a non-Semitic race, inventors of the cuneiform system of writing, and had attained an advanced civilization before 3000 B.C. They were succeeded by a Semitic people and amalgamated with them. The first line of kings mentioned by Berosus is supposed to have reigned from 2234 to 1976 B.C. A new dynasty succeeded from 1976 to 1518 B.C. This change is supposed to represent the conquest of Chedorlaomer, and the ascendency of the Elamitic race. For almost twelve centuries after this nothing certain is known of the history of Babylon, and it appears to have fallen under foreign subjection, particularly that of Assyria. A new line of Babylonian kings becomes known 747 B.C., beginning with Nabonassar I., who is stated by Berosus to have destroyed the annals of his predecessors, that the Babylonians might be compelled to date from himself. The fifth of this line is the Merodach-Baladan of Scripture. The fourteenth name is that of Nabopolassar (B.C. 625), who, joining the Medes against the Assyrians, freed Babylon from the superiority of the latter power. Nineveh was taken by the confederates, and the southern and western portion of the Assyrian territory being assigned to Nabopolassar, Babylon became an empire extending over the valley of the Euphrates to the Taurus, and partially over Syria, Palestine, Phœnicia, &c. It was further extended under Nebuchadnezzar (604–561), who subjected Jerusalem, Tyre, Phœnicia, and Egypt, and carried his dominion to the shores of the Mediterranean. Babylon, which even earlier was the seat of scientific, particularly of astronomical and astrological knowledge, was the capital of this empire. Commerce and industry introduced wealth, and this produced a love of luxury and magnificence. The manufactures of linen, cotton, and silk, were especially celebrated. Learning was confined to the priests, who are mentioned under the name of *Chaldeans*. Under Nabonidas the empire declined until Cyrus put an end to it by destroying the capital in 536, and united Babylonia with Persia. It shared the fate of Persia until A.D. 640, when it was conquered by the followers of Mohammed, who built Bagdad on the Tigris in 762. This became the seat of the caliphs, who were expelled in 1258, by Holagou, a prince of the Tartars. In 1534 Bagdad fell into the power of the Turkish victors, from whom Shah Abbas took it in 1613. It came, with Babylonia, anew under the dominion of the Turks in 1639, who possess it at the present day.

Of the original city Babylon, the foundation of which is attributed to Belus or to Semiramis, we know little or nothing; the Babylon described by the ancient writers is the city as restored by Nebuchadnezzar. It was situated on both sides of the Euphrates, which was crossed by a splendid bridge, and it formed, we are told, a square, each side of which was at least fifteen miles. In this area, however, there would be included much ground not built on. Near the centre stood the temple of Belus or Tower of Babel, rising by stages to the height of 625 feet. After the city was taken by Cyrus in 538 B.C. it began to decline, and had suffered severely by the time of Alexander the Great. He intended to restore it, but was prevented by his death, which took place here in 323 B.C., from which time its decay was rapid. The unimportant modern town of Hillah is believed to represent the ancient city, and the plain for miles round is studded with vast mounds of earth and brick, and imposing ruins. The chief mound is known as the Birs Nimroud. (See Babel.) This locality has been the scene of many investigations in recent times, and valuable dis-

coveries have been made by Rich, Rennel, Layard, Loftus, Rassam, Oppert, and others. The account of the civilization, arts, and social state of the Assyrians, given in the article ASSYRIA, may be taken as applying also generally to the Babylonians.

BABYROUSSA (a Malay word signifying stag-hog), a species of wild hog, sometimes called the horned or stag hog, from the great length and curvature of its upper tusks or canines, which curl upwards and backwards somewhat like the horns of Ruminantia, the lower canines being also very prominent. It is nearly of the size of a common hog, but rather longer, and with more slender limbs. The head, which is small, is brown above, and the body, which has a rough, thick skin, occasionally forming folds, particularly between the ears and cheeks, is of a dirty brown, covered sparingly, not with bristles, but a very short hair, growing out of small tubercles, to which the roughness of the skin seems to be chiefly owing; the upper part of the neck and belly, as well as the inside of the limbs, has a decidedly reddish tint, while a light dorsal band, about an inch broad near the neck where it begins, extends down the back and terminates near the tail. This band is better furnished with hair than the rest of the body, and is more distinctly marked in the male than in the female. The ivory of the tusks is less hard and durable than that of the elephant, but of very fine quality; and the flesh is very savoury, having a greater resemblance to that of the stag than the hog, but surpassing both in the delicacy of its flavour. The babyroussa is very numerous in Celebes, the Moluccas, and Java. It is hunted with dogs, and when taken makes little resistance; sometimes when pressed it endeavours to reach the sea, and eludes its pursuer by its dexterity in diving and swimming. The Dutch traveller Valentyn, who had ample opportunity of studying the habits of the animal in its wild state, says that it has a nice sense of smell, and when endeavouring to scent its enemy, it often stands on its hind legs and leans against the trunk of a tree. (See plate at article UNGULATA.)

BACCALAUREUS, a Latin word of the middle ages (of doubtful origin), which appears also in several other forms, and has given rise to the English word *bachelor*. It was used in various senses, being applied to a warrior not advanced to full knighthood, to a canon of the lowest rank, and to a scholar at a university who had passed three academical courses and examinations, and was himself entitled to give lectures without being reckoned among the independent lecturers. This was consequently the lowest academical degree, and the *baccalaureus* or *bachelor* is still one who holds a degree inferior to that of *master* or *doctor*. In one or other of the modern universities there are bachelors in the departments or faculties of arts, law, divinity, medicine, surgery, science, and music, and even women are admitted to the degree. At Oxford and Cambridge the bachelor, by keeping his name on the books and paying certain fees, can advance to the degree of master.

BACCHANALIA. See BACCHUS and ORGIES.

BACCHIUS. See RHYTHM.

BACCHUS (in Greek generally *Dionysos*), the god of wine, born of a mortal mother, yet one of the immortal gods. His history is one of the most perplexed in the Greek mythology. Semele was pregnant with him by Zeus. Before his birth, however, she became a victim of the craft of Hera. Zeus hastened to save the unborn fruit of his embrace, and concealed it till mature in his own thigh. He afterwards committed the infant to Hermes, who carried him to the nymphs of Nysa in India, where he grew and prospered. His teacher was Silenus, afterwards his constant companion.

In the vales of Nysa Bacchus invented the preparation of a beverage from grapes, and taught the planting of vines. To spread the knowledge of his invention he travelled over almost the whole known world, and received in every quarter divine honours. Drawn by lions (some say panthers, tigers, or lynxes), he began his march, which resembled a triumphal pomp, with a great suite of men and women, Sileni, Satyrs, and Mænades. Inspired by the presence of the god, rejoicing, brandishing the thyrsus, and crowned with vines and ivy, they danced around him, shouting '*Evoe! Eleleus!*' over hill and valley, accompanied by the tones of Phrygian flutes and timbrels. The Thebans would not acknowledge his divinity, and Pentheus armed himself against him. Bacchus resolved to punish the crime, and inspired the women with a fury which drove them from their dwellings to wander on Mount Cithæron. Pentheus himself was torn in pieces by his own mother and her sisters, to whom he appeared a wild beast. Bacchus punished the daughters of Mynias, who derided his feasts, with frenzy and transformation. At Naxos some Tuscan sailors attempted to carry him off to Italy, supposing him from his purple robe to be the son of a king. They fettered him; but the fetters fell off, vines and ivy entwined the vessel, and kept it fixed in the midst of the sea: the god transformed himself to a lion, and the seamen, seized with madness, leaped into the waves, where they were changed into dolphins. On the other hand, he rewarded such as received him hospitably and rendered him worship, as for instance Midas, who restored to him the faithful Silenus.

His love was shared by several; but Ariadne, whom he found deserted upon Naxos, alone was elevated to the dignity of a wife, and became a sharer of his immortality. To confer the same favour on his mother, Semele, he descended into the realms of Pluto, and conducted her to Olympus, where she was henceforth called *Thyone*. In the dreadful war with the giants he fought heroically, and saved the gods from impending ruin. During the rejoicings for victory Zeus joyfully cried to him, '*Evan, evoe!*' (Well done, my son!), with which words Bacchus was afterwards usually saluted. We find him represented with the round, soft, and graceful form of a maiden rather than with that of a young man. An ornament peculiar to him is the tiara. His long waving hair is gathered behind in a knot, and wreathed with sprigs of ivy and vine-leaves. He is usually naked; sometimes he has an ample mantle hung negligently round his shoulders; sometimes a fawn-skin hangs across his breast. The bearded Bacchus is properly of Indian or Egyptian origin. His head is sometimes shown with small horns (the symbol of invincible force).

The feasts consecrated to Bacchus were termed *Bacchanalia*, *Dionysia*, or in general *Orgia*. They were celebrated with peculiar solemnity in Athens, where the years were universally reckoned by them. During their continuance the least violence towards a citizen was a capital crime. The great Dionysia were celebrated in spring. The most important part of the celebration was a procession representing the triumph of Bacchus. This was composed of the above-mentioned train of Bacchantes of both sexes, who, inspired by real or feigned intoxication, wandered about rioting and dancing, and gave themselves up to the most extravagant licentiousness. They were masked, clothed in fawn-skins, crowned with ivy, and bore in their hands drinking-cups and rods entwined with ivy (*thyrsi*). Amidst this mad crowd marched in beautiful order the delegated bodies of the *phratria* (corporations of citizens). They bore upon their heads consecrated baskets,

which contained first-fruits of every kind, cakes of different shape, and various mysterious symbols. This procession was usually in the night-time. The day was devoted to spectacles and other recreations. At a very early hour they went to the theatre of Bacchus, where musical or dramatical performances were exhibited. All over Athens reigned licentiousness and revelry. These feasts passed from the Greeks to the Romans, who celebrated them with still greater dissoluteness, till the senate abolished them, B.C. 187.

BACCHYLIDES, born in Iolus, a city of the island Cos, the last of the ten great lyric poets of Greece, whom the Alexandrine canon declared classical. The nephew of Simonides, and a contemporary of Pindar (470 B.C.), he ranks as a poet beside them. Hiero, at whose court he lived, esteemed him highly, preferring him even to Pindar. Of his odes, hymns, pæans, triumphal songs, &c., till recently only fragments were known; but a few complete poems have latterly been obtained from Egyptian papyri. There are many traces of his influence in the odes of Horace. Without having the impetuous eagle-flight of Pindar, he was neither destitute of fire and energy, nor of grace and richness.

BACCIOCCHI, Maria Anne Eliza Bonaparte, sister of Napoleon, was born at Ajaccio, Jan. 8, 1777, and educated in the royal institution for noble ladies at St. Cyr. She lived during the revolution with her mother at Marseilles. In 1797 she married Captain Bacciocchi, who in 1805 was created Prince of Lucca and Piombino. In 1799 she went to Paris, and resided there with her brother Lucien, who awakened in her a taste for poetry and the fine arts. She collected around her the most accomplished men of the capital, among whom were the Chevalier de Boufflers, Laharpe, the Viscount Chateaubriand, and the Marquis de Fontanes. Generous as she ever was towards distinguished talent, she conferred particular obligations on the two last. Fontanes was patronized by Napoleon chiefly through her recommendation. Conscious of her intellectual superiority, she kept her husband in a very subordinate situation. It was she, in fact, who governed the principalities of Lucca and Piombino, and as Grand-duchess of Tuscany she enacted the part of a queen. When this *Semiramis of Lucca*, as a witty writer styles her, reviewed the troops of the duchy, her husband discharged the office of aid-de-camp. She introduced many improvements, though not properly assisted by the officers intrusted with her confidence. In 1814 she retired to Bologna, but was obliged in the following year to reside in Austria. Here she lived at first with her sister Carolina, afterwards with her family, under the inspection of the government, at Trieste, where she called herself the *Countess Compignano*. She died of a nervous fever, August 7, 1820, at her country seat, Villa Vicentina, near Trieste.

BACCIO DELLA PORTA, Francisco Bartolomeo, a celebrated painter, better known under the name of *Fra Bartolomeo di San Marco*,[1] was born in 1469 at Savignano, near Prato, in Tuscany. He learned in Florence the first principles of painting from Cosimo Roselli, and acquired a more perfect knowledge of art by studying the works of Leonardo da Vinci. He was an admirer and follower of Savonarola. On his death, in consequence of a vow made during the peril of persecution, he took the Dominican habit in 1500, and assumed the name of *Fra Bartolomeo*. For the space of four years he did not touch his pencil, and employed it afterwards only on devotional subjects. Raphael visited Florence in 1504, and gave instructions to Bartolomeo in perspective, receiving in return his lessons in colouring. Some years afterwards the latter visited Michael Angelo and Raphael at Rome. After his return to Florence he executed several religious pictures, among which were a Saint Mark and Saint Sebastian, which are greatly admired. His style is severe and elevated, but very graceful in youthful figures; his colouring, in vigour and brilliancy, comes near to that of Titian and Giorgione. But he particularly excels in drapery, which none before him represented with equal truth, fulness, and ease. He died in 1517. His pictures are preserved in the gallery of the grand-duke at Florence and in the palace of Pitti.

[1] *Fra* is the abbreviation of *frate* (brother), and is often put before the names of monks.

BACH, Johann Sebastian, among the German musical composers of the last century one of the most famous and the greatest of this name, so distinguished in musical literature, was born in 1685, at Eisenach; died in 1750, at Leipzig. He received his first instruction on the harpsichord at Ohrdruf from his elder brother Johann Christoph. After the death of his brother he studied music at Lüneburg, and made himself familiar with the French style while in the chapel of the duke at Halle; in 1703 entered into the service of the Duke of Weimar; went in 1704 to Arnstadt, where he attained great proficiency; was in 1707 organist at Mühlhausen; in 1708 organist of the court in Weimar; and in 1714 concert-master at the same place; afterwards, in 1717, chapel-master at Anhalt-Köthen; in 1723 chanter and director of music at St. Thomas's School at Leipzig; and in 1736 composer at the royal and electoral court of Saxony. His life has been written by Forkel. As a player on the harpsichord and organ Sebastian Bach had no equal among his contemporaries. His compositions breathe an original inspiration, and are chiefly of the religious kind. They consist of *cantatas* and *motets*, and many pieces for the organ and the piano.—Bach's family came from Presburg, in Hungary, which Sebastian's father, himself a good musician, left on account of religious difficulties and settled in Germany. More than fifty musical performers have proceeded from this family. Sebastian himself had eleven sons, all distinguished as musicians. The most renowned were the following:—Wilhelm Friedemann, born in 1710 at Weimar; died master of the chapel of Hesse-Darmstadt, at Berlin, in 1784. He was one of the most scientific harmonists and most skilful organists.—Karl Philipp Emmanuel, born in 1714 at Weimar; died in 1788 at Hamburg. After having studied law at Leipzig he went to Berlin as a musician in the Prussian service, and was finally director of the orchestra at Hamburg. He has composed mostly for the piano, and has published melodies for Gellert's hymns. His vocal compositions are excellent. His essay on the True Manner of Playing on the Harpsichord is, even now, a classical work in its kind.—Johann Christoph Friedrich, born at Weimar, 1732; died in 1795, master of the chapel at Bucheburg, a great organist, is known also by the music he has published.—Johann Christian, born in 1735 at Leipzig; died in London 1782, was, on account of the graceful and agreeable style in which he wrote, a favourite composer with the public.

BACHARACH, a small place of 1900 inhabitants on the Rhine, 12 miles S. of Coblenz. It has a wall flanked with towers, and the romantic remains of a Byzantine church, and a curious old castle. The vicinity produces excellent wine, which was once so highly esteemed, that Pope Pius II. (Æneas Sylvius) ordered every year a quantity to Rome, and the Emperor Wenceslaus granted to Nürnberg some important privileges for a moderate quantity of this delicious beverage. The view from the ruins of the castle is one of the sublimest on the Rhine.

BACHAUMONT, François le Coigneux de, born at Paris in 1624, took an active part in the troubles of the Fronde, and also wrote a good deal of light poetry. He reached the age of seventy-eight, dying in 1702, and is said to have died as a Christian, after having lived as an Epicurean. The name of the Fronde is said to have originated from a pleasantry of his. He said that the parliament reminded him of the schoolboys who played with slings in the *boulevards* of Paris, and dispersed at the sight of a police officer, but collected again as soon as he was out of sight. The comparison pleased; the enemies of Mazarin adopted hat-cords in the form of a sling (*fronde*), and were called *Frondeurs*.

BACHELOR. See Baccalaureus.

BACILLARIA, a name given to a group of microscopic vegetable organisms consisting of a single cell, multiplying by division or fission, and consisting to a large extent of siliceous matter. They are reckoned among the Diatomaceæ, the name being most properly applied to such of this class as have a rod-like form. They are found in vast numbers both in fresh and in salt water, and have also been detected in the coloured snow of the Alps. Their siliceous parts easily resisting destruction, they have been found in the fossil state in superficial lacustrine deposits, and in solid strata in different quarters of the globe. The softish stone known as *tripoli*, and much used for polishing, is entirely composed of remains of Bacillaria; and whole strata, among others the polishing slate of Bohemia, 14 feet thick, are almost entirely composed of them.

BACILLUS, the name given to certain minute (microscopic) vegetable organisms belonging to the class of Fungi, having more or less the appearance of little rods, and generally showing themselves in putrefactions or in certain diseased conditions of animals, when they may be present in the blood or other fluids. Various kinds of bacilli are named after the disease with which they are more especially associated, and thus the bacillus of tuberculosis, of anthrax, of cholera, &c., are spoken of. The word, indeed, is often used as synonymous with *bacterium*. See Bacteria, Germ Theory (in Supp.).

BACK, Admiral Sir George, Arctic explorer, was born at Stockport, Cheshire, in 1796, and entered the navy as midshipman in 1808. He saw some service during the war, and was for a time kept a prisoner in France. In 1818 he went with Franklin on an exploring voyage to the Spitzbergen Seas, and he shared in the same explorer's two land expeditions in the Arctic regions of N. America, to the Coppermine and Mackenzie rivers, undergoing extraordinary toils and hardships. In 1827 he obtained the rank of commander. In a subsequent journey of exploration conducted by himself he discovered and traced the course of the Back or Great Fish River, travelling a distance of 7500 miles, 1200 being over new ground. A result of this journey was his Narrative of the Arctic Land Expedition to the Mouth of the Great Fish River in 1833, 1834, and 1835. In 1836–37 he commanded H.M.S. *Terror* on a voyage to trace part of the Arctic coast of America, and of this voyage he also wrote an account. He was promoted to the rank of captain in 1835, and in 1839 was knighted. After his last voyage he never engaged in active service. He died June 23, 1878.

BACKGAMMON, a game played with dice by two persons on a board or table divided into two parts, upon which there are twenty-four black and white spaces called *points*, being long sharp triangular spaces. Each player has fifteen pieces or men, coloured black and white respectively to distinguish them. The men at starting are placed on the points in a certain position and order, and their subsequent movements are determined by throws of the dice.

BACKHUYSEN, or Bakhuizen, Ludolf, a celebrated painter of the Dutch school, particularly of seapieces, born in 1631 at Emden, was first employed as a clerk by his father, who was secretary to the States-general. He afterwards entered a mercantile house at Amsterdam, and, without instruction, began to sketch the vessels which arrived in the harbour. These attempts met with applause, and led him to devote himself entirely to painting. He received instruction from Van Everdingen, and soon acquired an extraordinary degree of facility and skill; but what most contributed to his rapid progress was the zeal with which he studied nature. On the approach of a storm he was accustomed to embark in a light boat, and calmly observe the motions of the waves, and the tossings of the agitated vessels. The terrified boatmen often forced him to the shore, in spite of his earnest entreaties. Full of what he had seen, he then hastened home, without speaking a word or allowing his attention to be distracted by any other object, and completed, with admirable exactness in the most minute particulars, the sketches which he had already made. This courageous zeal procured his pictures the first rank in their class. Several princes visited his rooms, and Peter the Great even wished to take lessons of him. The burgomasters of Amsterdam commissioned him to execute a seapiece, for which they paid 1300 florins, and which they presented, in 1665, to Louis XIV. In all his paintings the utmost truth prevails. His colours are excellent, and his touch is remarkably well suited to imitate the water and its motions: his skies are light, and of great variety. He died at Amsterdam in 1708. His pictures will always retain a high value.

BACON, Anthony, the son of Sir Nicholas, and elder brother to the celebrated lord-chancellor, was born in 1558. He studied at Cambridge, and travelled much. He resided in Paris, and in other parts of France, a considerable time. He there became acquainted with Henry IV., with whom, and with many of the first literati of Europe, he carried on an extensive correspondence after he had returned to England. He died in 1601.

BACON, Delia, American authoress, was the daughter of David Bacon, missionary, and the sister of Leonard Bacon, clergyman, writer, and anti-slavery advocate, and was born in 1811. She became a teacher, delivered lectures, and wrote Tales of the Puritans, and the Bride of Fort Edward, a drama. She is chiefly known, however, for her advocacy of the theory that the plays of Shakspere were written by Lord Bacon, a view expounded in her Philosophy of the Plays of Shakspere Unfolded, published in 1857, with a preface by Nathaniel Hawthorne. Though not the originator she was perhaps the most eloquent advocate of this extravagant notion, which latterly seems almost to have upset her mind. She died in 1859.

BACON, Francis, Viscount St. Albans, one of the most remarkable men of whom any age can boast; a reformer of philosophy, by founding it on the observation of nature, after it had consisted, for so many centuries, of scholastic subtleties and barren dialectics. He was born at London in 1561, his father being Sir Nicholas Bacon, Lord Keeper of the Great Seal. In his thirteenth year he entered the University of Cambridge, where he made astonishing progress in all the subjects there taught. He had not completed his sixteenth year when he wrote against the Aristotelian philosophy, which seemed to him more calculated to perpetuate disputes than to enlighten the mind. It was then the custom in England to send abroad, particularly to France, those

young men who were destined for public life. Young Bacon went to Paris in the suite of Sir Amias Paulet, who soon after sent him to England with an important message. He discharged it to the satisfaction of the queen (Elizabeth), returned to France, and travelled through several provinces of that country to study its manners and laws. The death of his father, in 1579, called him back to England where, in order to be enabled to live suitably to his rank, he devoted himself to jurisprudence, and pursued the study of the law with so much success that he was made counsel extraordinary to the queen before he was twenty-eight years old. This place was more honourable than lucrative. His professional labours did not, however, make him lose sight of the idea which he had early conceived, of reforming the plan of scholastic studies agreeably to sound philosophy. Bacon's talents and his connection with the lord-treasurer, Burleigh (who was married to a sister of Bacon's mother), and his son Sir Robert Cecil, first secretary of state, seemed to promise him the highest promotion. In 1584 he was sent to Parliament as member for Melcombe Regis, in 1586 he sat for Taunton. About 1591 he became a friend of the Earl of Essex, and when disappointed in not being made attorney-general the latter presented him with an estate in land. Bacon, however, soon forgot his obligations to his generous benefactor, and not only abandoned him as soon as he had fallen into disgrace, but without being obliged took part against him on his trial. Against this ingratitude the public voice was raised, and whatever Bacon might say in his justification, he remained at court the object of hatred to one party and of jealousy to the other, and the queen did not appear inclined to do anything in his favour. In Parliament he conducted himself for some time with dignity and independence. He had been chosen member for the county of Middlesex in 1593, and voted with the popular party against the measures of the ministers, though he continued in the service of the crown. But towards the end of Elizabeth's reign his parliamentary conduct became more servile. If anything can excuse him it is his poverty, which was so great that he was twice arrested for debt. The reign of James I. was more favourable to him. This prince, who was ambitious of being considered a patron of letters, conferred upon him in 1603 the order of knighthood. Having been commissioned to make a representation of the oppressions committed by the royal purveyors in the king's name, he executed the task with so much address as to satisfy both the king and the Parliament. The House of Commons voted him the public thanks, and James made him one of the king's counsel, with a pension of £40, which was soon followed by another of £60. His situation now continually improved; he contracted an advantageous marriage; was made solicitor-general and then attorney-general; in 1617 became lord keeper of the seals; in 1618 was made Lord High Chancellor and created Baron of Verulam, and in 1621 Viscount St. Albans. He might now have lived with splendour without degrading his character by those acts which have stained his reputation. Nevertheless, great complaints were made against him. He was accused before the House of Lords of having received money for grants of offices and privileges under the seal of state. He was unable to justify himself, and, desiring to avoid the mortification of a trial, confessed his crimes and threw himself on the mercy of the peers, beseeching them to limit his punishment to the loss of the high office which he had dishonoured. After he had acknowledged by an explicit confession the truth of almost all the charges, notwithstanding the intercession of the king, and the interest which they themselves took in one of their most distinguished members, the lords sentenced him to pay a fine of £40,000, and to be imprisoned in the Tower during the pleasure of the king. He was also declared for ever incapable of place or employment, and forbidden to sit in Parliament or to appear within the verge of the court. This severe sentence was doubtless just; yet it must be allowed that he was actuated neither by avarice nor corruption of heart, but that his errors are rather to be attributed to a weakness of character, which was abused by others. Traits of generosity and independence, which his life also displays, show clearly that he knew and valued virtue. He was unfaithful to it because he had not sufficient firmness to refuse the unjust demands of others. His sentence was not rigorously executed; he was soon released from the Tower, and the rest of his punishment was by degrees remitted entirely. He survived his fall only a few years, and died at Highgate April 9, 1626.

All the studies and efforts of this great man aimed at a reform in the system of human knowledge. He examined the whole circle of the sciences, investigated their relations, and attempted to arrange them according to the different faculties of the human mind to which each belongs. In this, however, he could not succeed for want of a well-founded and natural division of the powers of the mind; for he divided the sciences into those of the memory, of the understanding, and of the imagination. This he explains in his Instauratio Magna, under the head De Dignitate et Augmentis Scientiarum. He further perceived that, in all the branches of natural science, the only way to truth is by the observation of nature. How this observation is to be directed, and how nature is to be examined, is illustrated in several places. He explained his ideas on this subject in the above-mentioned treatise (De Dignitate, &c.), and in the Novum Organum Scientiarum. His universal genius had attended to all the sciences; he perceived to what point each of them had advanced, what false directions they had taken, and how they were to be brought back to truth. As a metaphysician he displays no less penetration than profoundness in his views of the operations of the mind, of the association of ideas, and of the prejudices which surround us from our cradle, and prevent the free exercise of reason. As a natural philosopher he brought forward very ingenious views, and was on the route to several important discoveries. He invented a kind of pneumatic machine, by his experiments with which he was led to suspect the elasticity and gravity of the air, which Galileo and Torricelli afterwards discovered. He apparently had a glimpse of the law of gravitation, which Newton afterwards proved. He wanted only experiments in order to demonstrate the principles of this power. He treated also of natural history, but only in a brief manner, in his work Sylva Sylvarum, &c. He wrote treatises dealing with medical subjects; among others, one on life and death. But physiology and chemistry were then so imperfectly understood, that he could not avoid falling into great errors. The science of law he treated not merely as a lawyer, but as a legislator and philosopher. His aphorisms are not less remarkable for profound views than for vigour and precision of expression. Morals are the subject of one of his finest works, entitled Essays or Sermones Fideles—showing the most profound knowledge of man and of human relations, and written in an eloquent and vigorous style. As an historian he is less distinguished, though his history of Henry VII. possesses solid merits. Of his knowledge of antiquity his work On the Wisdom of the Ancients bears witness, in which he explains the ancient fables by ingenious allegories. He possessed a less profound knowledge of mathematics, and to this it

is to be ascribed that he who so generally discovered the errors of the human mind, and pointed out the truth, opposed the Copernican system. In this point alone he remained behind some enlightened men of his time. In other departments of human investigation he soared to such a height, that his contemporaries could not fully estimate the extent of his genius, the justness of his views, and the importance of his labours. The best edition of his works, which are partly in English, partly in Latin, is that by Spedding, Ellis, and Heath (1857–74, 14 vols.; 7 containing Life and Letters by Spedding). Dr. E. A. Abbott's Francis Bacon (1885) is a valuable account of his life and works; and Dean Church's Life of Bacon (in the Men of Letters series) is also valuable, more especially as a corrective to Macaulay's misleading essay. A valuable exposition of his philosophy is given in Kuno Fischer's Francis Bacon of Verulam (1857).

BACON, John, English sculptor, was born in Southwark, 24th Nov. 1740. Having been apprenticed at the age of fourteen to a Mr. Crispe of Bow Churchyard, and employed in modelling and painting small porcelain ornaments for chimney-pieces, his ambition was awakened by seeing the models sent by sculptors to be baked in his master's pottery-furnaces at Lambeth. He therefore set himself to produce some works of a similar class, and such was his success that he obtained no fewer than nine premiums from the Society for the Encouragement of Arts. While yet an apprentice he formed a project for making statues of artificial stone, which was afterwards perfected and carried into effect in a manufactory in the New Road. About 1763 he began to work in marble; and shortly afterwards, seeing the imperfection of the method then in use, he invented an instrument for transferring the form of the model to the marble (technically called, 'getting out the points'), which instrument has been adopted since by other sculptors. When Canova came to London and saw it he expressed his admiration, and regretted he had not known it at an earlier period of his life. In 1768 he became a student of the Royal Academy, and next year he obtained the first gold medal for sculpture given by that society, and the following year he was chosen an associate. Having produced and exhibited a statue of Mars, Dr. Markham (afterwards Archbishop of York) employed him to produce a bust of the king for Christ Church, Oxford. Having obtained the royal patronage by this bust, he was employed to make a duplicate of it for the University of Göttingen. In 1777 he was commissioned to prepare the model of a monument in honour of Mr. Guy, the founder of Guy's Hospital, and he soon after had the honour of executing that of Lord Chatham in Guildhall. The year following he was chosen a full member of the Royal Academy, and completed a beautiful monument to Mrs. Draper (the 'Eliza' of Sterne) in Bristol Cathedral. His other works are too numerous to be specified, but the principal of them are two groups for the interior of the Royal Academy, the statue of Judge Blackstone for All Souls College, Oxford; another of Henry VI. for Eton College; the monument of Lord Chatham in Westminster Abbey; and the statues of Dr. Johnson and the philanthropist Howard in St. Paul's Cathedral. Bacon died Aug. 7, 1799. His son John (1777–1859) also became a distinguished sculptor, and executed various works still to be seen in St. Paul's and Westminster Abbey.

BACON, Roger, an English monk, who by the power of his genius raised himself above his time, made astonishing discoveries in several sciences, and contributed much to the extension of real knowledge. He was born in or about 1214, near Ilchester, in the county of Somerset, of an old and respectable family. He first entered the University of Oxford, but how long he studied there is not known. He went afterwards to that of Paris, then much frequented, where he seems to have distinguished himself much by successful study and teaching, and received the degree of Doctor of Theology. About 1250 he returned to England, where he entered the order of Franciscans, and fixed his abode at Oxford. Natural philosophy seems then to have been the chief object of his labours; but this study required expenditure beyond his means. He met, however, with generous friends of science, whose contributions enabled him to purchase books, to prepare instruments, and to make the necessary experiments. In examining the secrets of nature he made discoveries and deduced results which gained him the admiration of the enlightened, who comprehended their natural connection, but which appeared so extraordinary to the ignorant, that they were believed to be works of magic. This opinion was countenanced by the jealousy and hatred of the monks of his fraternity. He himself is said to have inveighed against the ignorance and corruption of the clergy, and in particular of the monks, and to have written a letter to the pope representing the necessity of reform. In revenge they are said to have denounced to the court of Rome his dangerous opinions and astonishing operations, which they attributed to the agency of the devil. The result was that in 1257 he was sent to Paris, where he was kept in confinement for no less than ten years. Among the few enlightened individuals who admired his genius and interested himself in his studies was the cardinal bishop of Sabina, papal legate in England, who, having ascended the papal chair, under the name of Clement IV., seems to have been the means of having him restored to liberty in 1267. Clement had demanded a general exposition of his scientific views; upon which Bacon wrote a work under the title of Opus Majus, giving a connected view of the different branches of human knowledge, supplemented soon after by two other works—Opus Secundum and Opus Tertium (all of which, as well as certain others of his writings, have been printed). Under Clement's successor, Nicholas III., the general of the Franciscans, Jerome of Ascoli, declared himself against Bacon, forbade the reading of his writings, and issued an order for his imprisonment, which was confirmed by the pope. This new confinement lasted ten years; and when Jerome of Ascoli was elected pope, under the name of Nicholas IV., Bacon vainly endeavoured to convince him of the innocence and utility of his labours, by sending him a treatise On the Means of Avoiding the Infirmities of Old Age. After the death of Nicholas IV. he regained his liberty, and returned to Oxford, where he wrote a Compendium of Theology, and died soon afterwards, probably in 1294.

Though an extraordinary man, Bacon could not entirely free himself from the prejudices of his time. He believed in the philosopher's stone and in astrology. There are to be found in his writings new and ingenious views on optics; for example, on the refraction of light, on the apparent magnitude of objects, on the magnified appearance of the sun and moon when in the horizon, &c. He describes very exactly the nature and effects of convex and concave lenses, and speaks of their application to the purposes of reading, and of viewing distant objects, both terrestrial and celestial; and it is easy to prove from his writings that he was either the inventor or improver of the telescope. He also gives descriptions of the *camera obscura*, and of the burning-glass. He made, too, several medical discoveries. The discovery of gunpowder has been attributed to him. His

writings contain the chemical formula of it, but it is generally supposed he derived it from the Arabs, from whose writings he derived many other suggestions. He was so well versed in Greek and Hebrew, and wrote Latin with such elegance and clearness, that his acquirements in these respects would alone secure him a high character. He was intimately acquainted with geography and astronomy, as appears by his discovery of the errors of the calendar, and their causes, and by his proposals for correcting them, in which he approached very near to truth. He himself made a corrected calendar, of which there is a copy in the Bodleian Library. Even in moral philosophy Bacon has laid down some excellent precepts, and is in every respect entitled to remembrance as a great philosopher and a wonderful man.

BACTERIA. See SUPPLEMENT.

BACTRIANA, or BACTRIA, one of the principal provinces of ancient Persia, and, before Cyrus, a powerful kingdom, the inhabitants of which were noted for bravery. On the N. and E. it was bounded by one of the largest rivers of Asia, the Oxus, now Gihon; on the S. it stretched along the Paropamisus; on the W. it reached Margiana. On account of its situation and fertility it had made great progress in civilization at a very early period. The Persians derived their mythology, religion, and architecture from Bactria. Bessus here declared himself sovereign of Asia, after the destruction of the Persian monarchy. It is to be regretted that our knowledge of this country is but slight. Even the companions of Alexander give no particular account of it.

BADAJOZ (with the Romans *Pax Augusta*), the fortified capital of the Spanish province of Badajoz, on the left bank of the Guadiana, which is crossed by a stone bridge of twenty-eight arches. Badajoz lies not far from the Portuguese frontiers, 82 miles N.N.W. of Seville, and forms the most important fortress on the side of Portugal. It contains a cannon foundry and a fine cathedral. During the Peninsular war Badajoz was besieged by Marshal Soult, and taken in March, 1811. It was twice attempted by the English, on 5th and 29th May, 1811, and was besieged by Wellington on 16th March, and taken 6th April, 1812. In the peace of Badajoz, concluded between Spain and Portugal, 6th June, 1801, Portugal promised to shut its harbours against the British. Morales was a native of Badajoz, which possesses several of his paintings. Pop. (1900), 30,809.

BADEN, GRAND-DUCHY OF, one of the more important states of the German Empire, in the S.W. corner of Germany, between lat. 47° and 49° N., and lon. 25° and 27° E. It is of very irregular form. On the W. and part of the S. its contour is defined by the Rhine; but in other directions it is much indented and mixed up with other states. The line through its centre, and forming a slight curve, with its convexity E, is about 175 miles. Its breadth varies from 13 miles, where it is narrowest, a little to the N. of Baden town, to 85 miles. Its area 5824 English square miles, divided into four districts, is occupied as follows:—Arable land, 1,352,800 acres; meadows and pastures, 658,600 acres; wood, 1,263,800 acres; vineyards and gardens, 74,760 acres; rivers and waste, 409,290 acres.

Physical Features.—Baden is decidedly mountainous, being traversed to a considerable extent by the lofty plateau of the Schwarzwald or Black Forest, which, commencing between Basel and Waldshut, proceeds in a N. direction, forming, by its W. side, the range of romantic precipices which bound the valley of the Rhine, while its E. side slopes much more gradually. Its highest point, the Feldberg, is 4675 feet in height. Another range, of no great elevation, though somewhat precipitous, called the Heiligenberg, attains its greatest height in the vicinity of Heidelberg. In addition to these ranges are the two smaller groups of the Kaiserstuhl and the Odenwald. The Odenwald is usually regarded as a continuation of the Black Forest, into which it merges imperceptibly. The nucleus of the Black Forest and Heiligenberg consists of gneiss and granite. The Kaiserstuhl is evidently of volcanic formation. The Odenwald is composed, for the most part, of red sandstone. Baden belongs entirely to the basins of the Rhine and the Danube; the former draining the far larger portion of the surface, while the latter occupies only a small portion of the S.E. corner, where it takes its rise, and merely runs the first few miles of its mountain course. Lakes, including a considerable part of the Lake of Constance and the whole of the Uberlingersee and Zellersee, are numerous. The variety of minerals is very great, but the number workable to profit is comparatively small. The number of mineral springs has been estimated at seventy, and of these not a few are of great celebrity, attracting to the different watering-places to which they have given rise, crowds of visitors from all parts of the world. The climate of Baden varies much with the surface. While in the valleys and plains all the ordinary fruits are coming to maturity, cold winter blasts are often felt among the mountains; and there are even ravines on the sides of the Feldberg from which the snow seldom entirely disappears. The open valleys in the S. are much warmer than in the N. The E. side, and also the Odenwald, are cold, lying exposed to the blasts from the Swabian Alps. The finest climate of Baden, and indeed of Germany, is in the valley of the Rhine. Here winter is short and spring early; the heats of summer are tempered by evaporation from the river and the lakes; the fields are covered with rich crops; and all the ordinary fruit-bearing plants and trees, particularly the vine and the chestnut, grow in luxuriance. Indeed, the vegetation throughout Baden is peculiarly rich, and manifests itself especially in the magnificent forests which line many of its valleys and clothe its mountain sides, furnishing supplies both of fuel and excellent timber, which are almost inexhaustible. The annual produce of grain is estimated at 1,390,125 quarters, of which rather more than one-half is spelt or German wheat, about one-fifth oats, one-ninth barley, and rather more than one-ninth rye. Large quantities of potatoes are grown throughout the country, and hemp of excellent quality; tobacco and hops in particular districts. The culture of green crops attracts a good deal of attention, and the soiling of stock is generally practised; but though scarcely a patch of land on which any crop can be raised is allowed to lie waste, and the collection of manure is never lost sight of, the science of agriculture cannot be regarded as far advanced. The rearing of cattle forms an important occupation. Numerous herds of goats and swine are fed in the Black Forest. In regard both to quantity and quality, few countries are richer in wine than Baden. Vineyards occupy a comparatively large extent of its surface, and several of the wines, both white and red, produced in them rank in the first class. Baden has long been famous for its fruits, among which may be mentioned extensive orchards, or rather forests of apples, pears, chestnuts, and particularly the cherries and plums of the Black Forest, from which are obtained the liquors which, under the name of Kirschwasser and Zwetschgewasser, are universally known and esteemed. The woollen, cotton, and linen manufactures are on a small scale. Among the more important manufactures is that of wooden clocks, confined chiefly to the districts of the Black Forest, and connected with it,

the making of musical boxes and other musical toys, in which extraordinary skill and ingenuity are displayed, and for which prices amounting from 12,000 to 15,000 florins (£1000 to £1250) have been obtained. The chief trade of Baden is derived from its forests. Timber of the finest quality, much of it adapted for ship-building, is transmitted to Holland by the Rhine, and by way of Basel to Switzerland and France, both of which also take large quantities of charcoal. The only other articles of trade deserving of notice are wine, particularly the Markgräfler, Klingelberger, and Staufenberger; liqueurs, especially Kirschwasser; hemp, tobacco, and fruit. Salt is exported in considerable quantities to Rhenish Prussia and Switzerland.

Population, Education, &c.—According to the census of the population of Baden, taken 1st Dec., 1905, the total number was 2,010,728, apportioned among the four districts into which the country is divided in the following manner:—

Districts.	Area in square miles.	Population.
Constance	1611	311,318
Freiburg	1880	543,305
Carlsruhe	993	567,397
Mannheim	1390	588,708
	5824	2,010,728

The pop. has just doubled itself since 1816, when it was 1,005,899. Between 1846 and 1855 it suffered a decrease—the decrease from 1846 to 1849 amounting to 4712; from 1849 to 1852 to 8282; and from 1852 to 1855 to the large number of 42,105, chiefly owing to emigration. It has again begun to increase at a moderate rate. The races which inhabit Baden are chiefly two, the Allemanni and the Franks; the former occupying the territory from the Murg to the Rhine, and the latter the territory to the N. of the Murg. The language corresponds to this territorial division; the Allemannisch prevailing in the high country, particularly in the valley of the Wiese, and in tolerable purity, though frequently intermixed with Swabian and Frankish. It is spoken with the least adulteration in the Black Forest. Education is very generally diffused, and the means employed for the purpose deserve honourable mention, even in Germany. Every village has at least one primary, and every town a grammar school. Parents are obliged to send their children to the schools, and continue them there for a certain period, or till a certain degree of proficiency is attained. Of a higher order than those mentioned are numerous seminaries, called real-schools, real-gymnasiums, progymnasiums, gymnasiums, &c. At the head of the whole are the two universities of Heidelberg and Freiburg. There is no proper religious establishment, but every form of religious belief is protected. About 36 per cent of the people are Protestants, including the grand-duke. The government is a constitutional monarchy, founded on a liberal representative basis. The executive power is vested in the grand-duke; the legislative in a parliament composed of two chambers analogous to the British House of Lords and House of Commons.

History.—The hereditary possessions of the house of Baden extend over little more than a fourth of its present territory. The reigning family dates its historical origin from Berthold, surnamed the Bearded, count of Thurgau and Brisgau. His grandson Herrman succeeded to his domains in the end of the eleventh century, and is the proper founder of the house of Baden. He took the title of margrave, and died in 1130. On the death of the Margrave Christopher I. in 1527, two lines were formed by his sons Bernard and Ernest; by the former that of Baden-Baden, by the latter that of Baden-Durlach. Both lines became united, in 1771, in the person of the Margrave Karl-Friedrich, who obtained considerable accessions of territory to his dominions, and died in 1811. The history of the state has been of little general interest. In the revolutionary period of 1848–49 the then grand-duke was forced to leave the throne for a short period, but was soon restored by the aid of Prussia. In the war of 1866 Baden sided with Austria against Prussia, and had to pay a heavy war indemnity.

BADEN, or very commonly BADEN-BADEN (anciently, *Civitas Aurelia Aquensis*), a town and watering-place in the Grand-duchy of Baden, 18 miles S.S.W. Carlsruhe, in one of the most beautiful localities of Europe. The older part of the town is built on a spur of the Black Forest, overhanging the valley of the little stream Oosbach. The houses here are in general old and high; the streets mostly narrow and crooked, and nearly all steep. The new and larger portion of the town lies below, and is rich in fine hotels, elegant villas, and handsome private dwellings. The edifices most deserving of notice are the New Palace, standing on an isolated height above the town, and surrounded by fine gardens; the town or parish church, containing the tombs of fourteen margraves of Baden; the Protestant church, the English church, and the new town-hall. Baden has been celebrated from remote antiquity for its thermal baths, which made it a favourite resort of the Romans. The so-called Konversationshaus, built for the accommodation of visitors, contains dining, concert, and ball rooms, and is surrounded by fine grounds; other buildings are the Trinkhalle, where the waters are drunk; and the Friedrichsbad or principal bath-house. The season lasts from 1st May to 31st October, and 60,000 visitors arrive annually. Pop. (1890), 13,889; (1905), 20,932.

BADEN, a town of Austria, 15 miles south-west of Vienna, at the foot of the Styrian Alps. It has numerous hot sulphurous springs (84° to 99° Fah.), used both for bathing and drinking, and very much frequented. They are, for the most part, 'society baths,' in which the bathers, male and female, in ample dressing-gowns, mix promiscuously, and walk about up to the neck in the steaming water. They are efficacious in cutaneous diseases, gout, and rheumatism. Pop. (1890), 15,776; (1900), 17,734.

BADEN, a town, Switzerland, canton Aargau. The town (*Ober-Baden*, or *Baden-im-Aargau*) is 12 miles N.E. Aarau, in a narrow defile on the left bank of the Limmat, which is here crossed by a wooden bridge. It has a town-hall, a handsome Roman Catholic church, a convent, monastery, hospital, &c., and is celebrated for its hot sulphurous baths, which are employed in gout, rheumatism, and cutaneous diseases. The hottest springs have a temperature of 116° Fah. The Romans were well acquainted with the baths here; and between the fifteenth and eighteenth centuries they were the most celebrated in Europe. Pop. (1900), 6109.

BADEN-BADEN, LOUIS WILLIAM I., MARGRAVE OF, grandson of the Margrave William I. of Baden-Baden, born at Paris, April 8, 1655, where Louis XIV. was his godfather. He served his first campaign under Montecuculi, against Turenne in Alsace, where this great general fell. The Prince of Baden was ordered to harass the retreat of the French army, which he did with success till Condé took the command. Montecuculi gave in his resignation, and the Duke of Lorraine succeeded him. Louis served under this general until the Peace of Nimeguen, when he returned, in 1678, to his margraviate. When the war between Austria and Turkey broke out he threw himself, with a body of troops, into Vienna, which was besieged by the Turks. The

Duke of Lorraine and the King of Poland, Sobieski, came to the relief of this capital, and Louis effected a junction with them by a vigorous sally. The city was relieved, the Turks retired in disorder, and Louis gained several victories. He subsequently received the command in chief of the imperial army on the Danube, and defeated the Turks, Sept. 24, 1689, at Nissa, and Aug. 19, 1691, at Salenkemen. In 1693 he was intrusted with the command of the imperial army in Germany against the French; he retook Heidelberg, and afterwards visited England, to concert with King William the plan of operations against France. He opened the campaign in the spring of 1694, invaded Alsace, baffled the vigilance of the Duke of Lorges, and showed the greatest activity, though he suffered violently from the gout. When the throne of Poland was vacant by the death of Sobieski, in 1697, he was among the competitors for the crown. When the Spanish war of succession broke out he commanded the imperial army, and in 1702 took Landau, notwithstanding its valiant resistance. In 1703 he showed his talents in the art of fortification by laying out the famous lines of Stollhofen, which extended from the Black Forest, through Bühl, to Stollhofen and the Rhine. After having made twenty-six campaigns, commanded at twenty-five sieges, and fought thirteen battles, he died at Rastadt, January 4, 1707.

BADENOCH, a mountainous district in Inverness-shire, 33 miles in length, and 27 in breadth. The population of the district is small.

BADGER (*Meles*, Briss.), a genus of mammiferous quadrupeds belonging to the plantigrade tribe, which place the soles of the hinder feet on the ground in walking. The head of the animals pertaining to this genus is very similar to some of the smaller varieties of dogs, having a moderately elongated snout, small eyes, and short, rounded ears. The teeth bear a considerable resemblance in figure and arrangement to those of the bear, to which genus that of the badger is closely allied. The body is large, supported on short, stout legs, and the paws are enveloped by the integument, so as to leave but a small part free, and are provided with long, curved claws, especially adapted for burrowing. The badger resembles the skunk and weasel in having a pouch beneath the tail, from which a fetid fatty humour exudes. Its motions are slow, and the belly appears to be trailed along the ground, although the length of hair on the inferior part of the body makes this trailing appear greater than it really is. Possessing a considerable strength of limb, and claws especially suited for the purpose, the badger excavates a long and winding cavern, at the extremity of which it sleeps securely during the daytime. At night it comes out to seek for its food, which consists either of vegetables, insects, or small birds, &c.—a regimen which shows the similarity of this genus to the bear as much as its general resemblance of structure. When attacked by dogs or other enemies, the badger defends itself with great resolution, and inflicts many severe wounds on the aggressors before it is finally vanquished. Formerly it was often the victim of a cruel sport, being placed in a box or barrel and dogs being set to draw it out. Foxes often drive out the badger from his den, and enlarge it for their own use. On the whole, the badger is a harmless creature, seldom seen unless hunted for, and doing very little injury, except when greatly multiplied. The female brings forth three or four at a litter. (See the plate at article CARNIVORA.)

Only two species of the badger are known, the European (*M. vulgaris*) and American (*M. Labradorica*). The European badger has a broad, white stripe from its forehead down to the nose; and a longitudinal black stripe begins between the eye and snout, on each side, dilating as it goes backward, until it includes the eye and the ear, behind which it terminates. The hair covering the body is harsh, long, scattered, and of three colours, white, black, and red, differing in the proportion of these tints in different parts. Black is the predominant colour on the inferior parts of the body.—The American badger is only found in the remote western territories of the United States, and in some parts of the British possessions in America. It is very different from the European in physiognomy, having a forehead projecting considerably above the root of the nose, which, in the European species, forms a continuous line with the forehead, and in having a longer tail, covered with long hair, reaching almost to the ground when the animal is walking. The tail of the European badger is not more than half the length of the legs. The colour of the American badger is chiefly grayish, and lighter than that of the European. The weight of the American species is from 14 to 18 lbs.

BADIA, DOMINGO, a Spanish traveller who, under singular circumstances, visited in 1803 and the four following years the Mohammedan countries bordering on the Mediterranean. During the whole of his tour he professed to be a Mussulman, which character he had qualified himself to support by submitting to circumcision. He travelled under the denomination of *Ali Bey el Abbassi*, which style he also assumed in his travels, published in French at Paris, by Didot, in 1814, two vols. 8vo; and about the same time in English at London. It is now admitted that he was employed as a political agent by the Prince of Peace, at the instigation of Napoleon. His peculiar situation and religious profession gave him opportunities for making many observations which could not occur to other travellers; and his volumes are curious and interesting, though rather tinctured with an air of exaggeration, somewhat excusable in a person placed in such extraordinary circumstances He died at Damascus in 1818, and it is suspected by foul means.

BAENA, a town, Spain, in Andalusia, province of, and 24 miles S.S.E. from Cordova, on the right bank of the Marbella. It has hilly though tolerably good streets, two principal and two smaller squares, four parish churches, a town and court house, several well-attended schools, two hospitals, a prison, numerous convents, and manufactures of linen, woollen, and cotton fabrics. Large quantities of grain and oil are exported to Malaga. Pop. (1897), 11,994.

BAERT, or BART, JEAN, born at Dunkirk, 1650, the son of a poor fisherman. He raised himself, under Louis XIV., to the rank of commodore. The Dutch, English, and Spanish called him the *French devil*. The marine of Louis XIV. owed principally to this rough mariner the respect which it enjoyed from other nations. Bart happening to be at Versailles, the monarch said to him, 'Jean Bart, I have made you a commodore.' 'Sire, then you have done well,' answered the mariner. The courtiers laughed; but Louis told them, 'This is the answer of a man who feels his own worth.' Bart brought into port a number of Dutch and English vessels, burned others, landed at Newcastle, and laid waste the neighbouring country. In 1692, with a fleet of three sail, he met the Dutch fleet loaded with corn from the Baltic, put to flight the escort, and took sixteen merchantmen. In 1694, when there was a scarcity of corn in France, he succeeded several times, notwithstanding the watchfulness of the English, in bringing into the harbour of Dunkirk ships loaded with this article. Once he delivered a number of such vessels, in the boldest manner, from the Dutch, into whose hands they had fallen, and received, in consequence, letters

of nobility. In 1695 he was taken prisoner by the English and brought to Plymouth, but managed to make his escape. In 1696 he met the Dutch fleet from the Baltic, consisting of 110 sail, and convoyed by five frigates. The escort, with forty ships, soon fell into the hands of the French; but on his return to Dunkirk thirteen Dutch ships of the line appeared, and to avoid a very unequal combat he was obliged to burn the greater part of his captures. From the Peace of Ryswick to the breaking out of the war of the Spanish Succession he lived at Dunkirk. He died there in 1702. A monument has been erected to him in his native place.

BAEZA (anciently, *Beatia* or *Biatia*), a town of Spain, in Andalusia, 22 miles E.N.E. from Jaen, and in the province of Jaen. It is pleasantly situated on a height amid rich and well-watered plains, and from a distance presents a very striking appearance with its old walls, churches, and steep-roofed houses. It has several good streets and three squares, one of which is lined by a range of porticoes. The principal edifices are the cathedral, the old Aliatares tower, the town-hall with a fine façade, and an old monastery, now a theatre. Pop. (1897), 14,172.

BAFFIN, William, an English navigator, famous for his discoveries in the Arctic regions, but the date of whose birth is unknown. He visited West Greenland as a pilot in 1612, again in 1615, and made voyages to Spitzbergen in 1613 and 1614. In 1616 he ascertained the limits of that vast inlet of the sea since distinguished by the appellation of Baffin's Bay, and also discovered and named Smith's Sound, Lancaster Sound, &c. In 1617–22 he was in the employment of the East India Company, and on board vessels belonging to them in the Indian seas. He was killed at the siege of Ormuz, on the Persian Gulf, in 1622, the English being acting here as allies of the Shah of Persia in attempting to drive out the Portuguese.

BAFFIN'S BAY, a considerable expanse of sea on the N.E. of North America, between Greenland and the islands that lie on the N. of the continent; between 68° and 78° N. lat.; discovered by Baffin in 1616. By Davis' Strait it communicates with the Atlantic, Lancaster Sound and Jones Sound lead westwards from it into the Arctic Ocean, while Smith's Sound leads out of it towards the north.

BAGDAD, capital of a Turkish vilayet of the same name (containing about 54,500 square miles and 850,000 inhabitants), in the southern part of Mesopotamia (now *Irak Arabi*). The greater part of it lies on the left or eastern bank of the Tigris, which is crossed by two bridges of boats. The old Bagdad, the residence of the caliphs, said to have had 2,000,000 inhabitants, was situated on the western bank of the river. The modern city is surrounded with a brick wall about 6 miles in circuit, partly in a ruinous condition, and with a ditch from 5 to 6 fathoms deep, intended to be filled with water from the Tigris. The houses, mostly built of brick, are but one story high, the streets unpaved, and so narrow that two horsemen can scarcely ride abreast. The houses of the wealthy are distinguished by a better architecture. The palace of the governor is spacious, and magnificently furnished; the English Consulate is also a good building, with a fine garden. Under the rule of Midhat Pasha in 1868–72 various improvements were carried out, but neglect has made matters as before. Of the mosques, about 100 in number, only a few attract much notice, and many are in ruins. Their architecture is in general inferior to that of other Mohammedan cities, but they have a gaudy appearance from the glazed tiles covering their domes and minarets, and arranged in a kind of mosaic work in various colours. The bazaars are spacious, and well stocked with goods. That built by Daoud Pasha still ranks as one of the most splendid in the world. Bagdad long commanded a large part of the traffic between Europe on the one hand, and Persia and India on the other. The Persian and Indian trade is still considerable, as also that with Europe, a large portion of it being carried on by steamers up and down the river. The trade with Europe was formerly more largely by land, passing through the Syrian Desert to Damascus, or by way of Armenia northwards. Since the opening of the Suez Canal the sea routes are of far more importance. If the so-called Bagdad Railway is completed many changes will no doubt take place. This railway is planned to run from Konieh, the terminus of the Anatolian Railway, to Bagdad, Basra (Bassorah), and the Persian Gulf, the total length being about 1500 miles, the funds to be provided chiefly by German and French financiers. Wool is the chief export to Europe, others being wheat, gum, galls, dates, &c. The heat of the summer is oppressive in Bagdad, but the climate is on the whole agreeable and healthy. The population amounts to between 150,000 and 200,000, three-fourths being Turks.

Bagdad was founded in 762 by the Caliph Almanzor, and raised to a high degree of splendour in the ninth century by the famous Harun Al Rashid, who figures so often in the Arabian Nights. It then became the chief city in the Moslem world, and a great centre of culture and learning. In the thirteenth century it was stormed by Hulagu (Holagou), grandson of Genghis-Khan, who caused the reigning caliph to be slain, and overthrew the caliphate. The descendants of the conqueror were expelled in 1392 by Tamerlane. In the fifteenth century Shah Ismael, the first sovereign of Persia of the house of Sofi, took possession of the city. From that time it was a perpetual subject of contest in the wars between the Turks and Persians. After a memorable siege, in 1638, it was conquered by the Turkish emperor Murad IV., and Nadir Shah endeavoured in vain, in the eighteenth century, to wrest it from the Turks.

BAGGESEN, Jens, a Danish poet, who also wrote much in German, was born Feb. 15, 1764, at Korsör. He travelled extensively in Europe, and on his return received an appointment from the Danish government. He possessed great sensibility and imagination, and his works are said to present a singular mixture of contradictory qualities. He died at Dresden, Oct. 3, 1826. His best productions are his smaller poems and songs, several of which are very popular with his countrymen. His Seasons, in Danish, are much esteemed.

BAGNÈRES DE BIGORRE (anciently *Aquensis Vicus, Aquæ Bigerronum*), a celebrated watering-place of France, in the department of Hautes Pyrénées, capital of the arrondissement of same name, at the entrance of the valley of Campan, on the left bank of the Adour, 13 miles S.S.E. from Tarbes. Its site is one of the most romantic in the Pyrenees. Well-cultivated slopes surround it on all sides, and are terminated in the distance by a mountain range, the most conspicuous summit in which is the Pic du Midi. The town is well built, and contains several good squares, and numerous spacious, handsome streets. Bagnères owes its chief celebrity to its baths, which are sulphurous and saline. The bathing establishment, called Fracasti, is very complete, and is the largest and most handsome building of the town. It stands at one of its extremities, immediately under Mount Olivet, and is approached by a long avenue of poplars, winding through a verdant valley. The inhabitants depend chiefly on the baths, almost every house receiving lodgers; but the manu-

factures are of some importance. The chief of these are a kind of crape and a fine woollen gauze, woven into shawls and scarfs. The springs here were known to and used by the Romans, and various ancient remains are still in existence. Pop. (1906), 6661.

BAGNÈRES DE LUCHON, a town of France, in the department of Haute-Garonne, one of the principal watering-places of the Pyrenees, having sulphurous thermal waters, said to be beneficial in rheumatic and gouty complaints, nervous ailments, skin diseases, &c., and used chiefly as baths. The town is situated in the picturesque valley of Luchon, surrounded by hills covered with wood. The main street forms a splendid avenue, at the W. end of which the large bathing establishment is placed. There is also a large and splendid casino building of recent erection, comprising a theatre, concert and ball rooms, &c., and containing a large-scale model of the Pyrenees, giving an excellent idea of the configuration of the range. The neighbourhood exhibits some of the most interesting scenery of the Pyrenees. Visitors number from 30,000 to 40,000 annually, and are most numerous in the months of July and August. Resident pop. 4000.

BAGNI (Italian for 'baths'), a name in Italy for various places which possess natural baths or thermal springs, distinctive appellations being appended to mark the particular locality. Thus there are BAGNI SAN GIULIANO, in the province of Pisa, and some 4 miles north-east of the city of that name; and BAGNI DI LUCCA, in the province of Lucca, and about 13 miles north-east of the city of Lucca, at present one of the most frequented of the bathing places of Italy.

BAGPIPE, a well-known wind instrument, of high antiquity among various nations, and so long a favourite with the natives of the Highlands of Scotland that it may now be considered as their national instrument. The peculiarity of the bagpipe consists in the fact that the air producing the music is collected into a leathern bag, from which it is forcibly pressed into the pipes by the arm of the performer. The *chanter*, a pipe into which is inserted a reed for the production of the sounds by the action of the air from the bag, is perforated with holes like the German flute, which are stopped with the fingers. The other parts of the instrument, in the common Highland form, are three tubes or *drones*, which are also furnished with reeds. Two of the drones are in unison with D on the chanter, which corresponds with the lowest note of the German flute. The third drone, which is the longest, is an octave lower. The tuning of the bagpipe is accomplished by lengthening or shortening the tubes or drones, as may be required. Its compass is from the G of the treble stave to the A above it, but its scale is imperfect. The Highland bagpipe is a powerful instrument, and calls for great exertion of the lungs, the air being forced into the bag by a pipe held between the lips. The Irish bagpipe is smaller, softer in its notes, and is always played with bellows that force the air into the bag. It has a number of keys on the chanter and drones, and is a much more perfect instrument musically than the Highland. A Lowland Scotch form of the bagpipe is also played with bellows. It is not known when the bagpipe first found its way into Scotland, but it is probable that the Norsemen first introduced it into the Hebrides, which islands they long possessed. In England it was common from Anglo-Saxon times, and is familiarly referred to by Chaucer and Shakspere. The bagpipe is indeed of very ancient origin, as representations of it are to be found on Grecian and Roman sculptures; and it has long been well known among various eastern nations. In Italy to this day, or at least in certain parts of it, the bagpipe is still a popular instrument among the peasantry, but the Italian form of it is more simple than the Highland and Irish.

BAHAMA ISLANDS, or LUCAYOS, a group of islands in the West Indies, belonging to Britain, many of them mere rocks, lying N.E. of Cuba, and S.E. of the coast of Florida, the Gulf-stream passing between them and the mainland. They extend a distance of upwards of 600 miles, and comprise 20 larger islands, besides keys and rocks innumerable. The principal islands are Grand or Great Bahama, Great and Little Abaco, Andros Islands, New Providence, Eleuthera, San Salvador, Great Exuma, Rum Cay, Watling Island, Long Island, Crooked Island, Acklin Island, Mayaguana, Great and Little Inagua. New Providence, one of the larger islands, is, from its geographical position and natural advantages, the most important of the group. Generally speaking, they present a flat appearance, and are mostly long and narrow. They are formed of calcareous rock, honey-combed and perforated with cavities. Of the whole group about 20 are inhabited, the most populous being New Providence. Some of the largest are but thinly peopled, while others, again, are almost unexplored. The climate, though hot, the thermometer varying from 80° to 96° in summer, is healthy, and in winter attracts visitors from the U. States and Canada. The rainy season is from May to October. Though thin the soil is fertile, and the islands produce oranges, limes, lemons, pine-apples, pomegranates, figs, bananas, and other fruits, vegetables, cotton, sugar-cane, &c. The general wild vegetation is a close growth of trees, comprising mahogany, mastic, lignum vitæ, dyewoods, &c., with an entangled underbrush. Numbers of cattle are reared, and the hog and agouti are found wild. There are many kinds of birds, including humming-birds, flamingoes, parrots, ducks, geese, pigeons, &c. The seas swarm with fish and many persons are employed in fishing. In some of the islands there are natural salt-ponds of great value. Turtles abound, and are an article of export. The growing of fruit has in recent times become an important industry. The pine-apple is largely exported, the fruit being mostly shipped in the green state. Canned fruits are also exported. Sponges are largely obtained, and are exported to the value of £60,000 or £70,000 annually. The sisal hemp is now being cultivated with great success. Cotton and the sugar-cane are not much cultivated. A large number of the population used to consist of 'wreckers', who followed as a calling the occupation of rescuing the crews and cargoes of shipwrecked vessels, shipwreck being a calamity unfortunately rather frequent in these intricate and dangerous seas. But the erection of lighthouses, the use of steam, and the diversion of trade routes has greatly decreased the number of persons making a living in this manner. There are numerous public and private schools, and in New Providence attendance is compulsory; yet owing to the way in which the inhabitants are scattered education is rather backward. The colony forms a diocese of the Anglican church, but the Wesleyans and Baptists are the bodies with the largest number of adherents. These islands were the first American land met with by Columbus, who fell in with an island called by the natives Guanahani, Oct. 12, 1492, believed to be Watling Island. New Providence was discovered on the 17th of the same month. The inoffensive inhabitants were afterwards removed by the Spaniards to act as slaves in Hispaniola, &c., and the race soon became extinct. The islands remained long uninhabited, but in 1629 New Providence was colonized by the English, who were expelled by the Spaniards in 1641. In 1667 the English re-

turned, and in 1680 Charles II. of England granted all the Bahamas to the Duke of Albemarle and the other proprietors of Carolina. For many years the inhabitants suffered severely from the depredations of pirates and of their Spanish neighbours. After 1718 a more settled state of matters prevailed. The town of Nassau was fortified in 1740. Early in the American war it was taken by the Americans, but speedily abandoned. The Spaniards took it again in 1782, but the British soon repossessed themselves of it. Since that period all the islands have continued under British jurisdiction. During the American civil war Nassau became the centre of the blockade-running trade, and was a scene of great traffic and bustle for two or three years. The government is vested in a governor, an executive council of nine, a legislative council of nine, and a House of Assembly of twenty-nine members. The seat of government is Nassau, in New Providence. The revenue and expenditure are each just about £70,000 annually. The imports in 1904 were £297,241; the exports, £194,936. Pop. (1891), 47,565; (1901), 53,725.

BAHAR, or BARRE, weights used in several places in the East Indies. They have been distinguished as the *great bahar*, with which are weighed pepper, cloves, nutmegs, ginger, &c.; and the *little bahar*, with which are weighed quicksilver, vermilion, ivory, silk, &c. But this weight varies much in different parts of the East, being in some places not much above 400 lbs., in others considerably over 500.

BAHIA, formerly *St. Salvador*, till 1771 the capital of Brazil, is situated on the Bay of All Saints, in the Brazilian state of the same name. It consists of a lower town, which is little more than an irregular, narrow, and dirty street, stretching about 4 miles along the shore; and an upper town, several hundred feet above the former, connected with it by steep ascents and much better built. The principal edifices, solidly but not tastefully built, are a cathedral, and various other churches, gorgeously decorated; a college, an archbishop's and a governor's palace, &c. The harbour is one of the best in South America; and the trade is important, the exports being tobacco and cigars, coffee, cocoa, hides, piassava, sugar, &c. There are cotton-mills and other industrial establishments. Total imports in 1908, £2,085,177; exports, £3,005,159. Pop. (1897), 250,000. The state has an area of 164,500 square miles; pop. about 1,920,000. It is traversed from S. to N. by a mountain range, with many offsets; is watered by the Rio Grande do Belmonte, Contas, Paraguassu, and S. Francisco; and has much fertile land, both along the coast and in the interior, though much of the latter remains uncultivated.

BAHIA BLANCA, a seaport of the Argentine Republic, near the head of a bay of same name opening into the Atlantic, about 350 miles south-west of Buenos Ayres. It is a rising place of recent origin, connected by railway with the capital, and is also a terminus of other railways from the interior. It carries on a considerable trade directly with Europe. The town proper is several miles distant from the port. Pop. 10,000.

BAHRDT, KARL FRIEDRICH, a German theologian, born in 1741 at Bischofswerda, in Saxony, studied in Schulpforta and Leipzig. In 1766 he was appointed professor in the University of Leipzig, but he lost this position in 1768, and henceforth led an unsettled life. He was successively professor of theology and preacher in Erfurt (where he was made Doctor of Theology), in Giessen, Switzerland, and in Dürkheim, but was obliged to leave each of these places on account of his attacks on the clergy, his heterodox views and his irregular life. At length he found an asylum in the Prussian dominions. In 1779 he went to Halle, where he published his creed. It is thoroughly deistical, denying the miracles, and not insisting on the immortality of the soul. He lectured in Halle, but soon became involved in difficulties with the clergy; upon which he left the city, and established, in a neighbouring vineyard, a public-house, where he had many customers, whose vitiated tastes and depraved habits he made no scruple of gratifying by any means which promised to prove attractive, how infamous soever they might be, Ultimately, in consequence of two works which he wrote, the patience of government was exhausted. He was brought to trial, condemned, and confined in the fortress of Magdeburg. Here he wrote his life. At the end of a year, having regained his liberty, he again opened his public-house at Halle, and died in 1792. Bahrdt wrote and spoke with ease and fluency, but his works, even the most learned of them, are wanting in thorough knowledge, and sin grievously against good taste.

BAHR-EL-ABIAD, BAHR-EL-AZREK. See NILE.

BAHR-EL-GHAZAL. See SUPP.

BAIADEER. See BAYADERE.

BAIÆ, the most celebrated watering-place of antiquity, on the coast of Campania, in Italy, 10 miles west of Naples, now represented by a castle on a height, a few houses, and remains of ancient buildings, among them so-called temples of Venus, Mercury, and Diana. Its popularity was due to its splendid situation and its mineral springs, and its climate, now very unhealthy, appears not to have been salubrious even in ancient times. It reached the summit of its splendour in the Augustan age, and became known for luxury and vice. Horace preferred it to every other place, but Cicero thought it necessary to apologize for defending a man who frequented Baiæ.

BAIKAL, a large fresh-water lake in Eastern Siberia, extending for 376 miles, with a breadth of 20–70 miles, in a north-east to south-west direction on the frontiers of Transbaikalia and the government of Irkutsk. Its area is 13,500 square miles (about the same as Tanganyika), and it stands at a height of about 1500 feet above sea-level. High and rugged mountains almost completely surround it, and among the numerous evidences of former volcanic activity are the hot springs on its shores and the comparatively frequent earthquakes. The greatest depth, found in the southern part of the lake, is 4746 feet. Olkhon island, close to the western shore, and the opposite peninsula of Svyatoi Nos divide it into two basins. Of the three hundred streams which discharge into it the largest are the Upper Angara, the Barguzin, and the Selenga, all entering from the east; and its waters flow to the Yenisei through the Angara, which leaves it on the south-west. Its water is extremely clear. From about the end of December to the latter half of May its surface is frozen over, and a lively traffic is carried on over the ice. During the rest of the year steamers ply from Listvenichnaya, near where the Angara flows out, to Posolskoye, the mouth of the Selenga, and Verkhne-Angarsk (at the north end of the lake). A road round the south end was made in the sixties of last century, and the Siberian railway now follows this route, but for some time the trains were carried across the lake from Posolskoye to Listvenichnaya on steamers specially constructed for ice-breaking. The lake is rich in fish of many kinds (salmon especially, which ascend the Yenisei and Angara all the way from the Arctic Ocean), and fishing is a flourishing industry. A species of seal forms part of its fauna, which bears generally a maritime character. The shores are scantily peopled.

BAIKIE, William Balfour, M.D., naturalist and traveller, was born at Kirkwall, Orkney, in 1825. He studied medicine at Edinburgh, and after receiving his degree entered the royal navy as assistant surgeon. He served in the Mediterranean, was assistant surgeon at Haslar Hospital in 1851–54, and was then appointed surgeon and naturalist to the Niger Expedition, which was about to start for the exploration of this river. The death of the captain of the exploring vessel the *Pleiad* left him in chief command, and he succeeded in reaching a point 250 miles higher up the river than had previously been attained. He published an account of the voyage in 1856. After a short stay in England he was entrusted with the command of a second expedition to the same region, and though he encountered very great difficulties he was able to establish a settlement at the confluence of the Niger and Benue, and in the course of a few years did much to spread civilization among the natives of the neighbouring regions. He died at Sierra Leone on his way home to Britain, 12th Dec., 1864. He was joint author with Mr. R. Heddle of Mammalia and Birds observed on the Orkney Islands (Edin. 1848).

BAIL, in law, is the delivery of a person to another for keeping, and is generally used in reference to one arrested, or committed to prison, upon a criminal process, such person being said to be *bailed* when he is delivered to another (or is supposed to be so, but is simply set free from custody), who becomes his surety (to a greater or less amount according to the crime with which he is charged) for his appearance at court to take his trial. The person who thus becomes surety is said *to become bail*, and the amount itself is also called *bail*. Bail may generally be granted except in the case of treason. The word is not used as a plural.

BAILEY, Nathaniel (or Nathan), English lexicographer, the author of the most useful English dictionary previous to that of Dr. Johnson, was born probably between 1660 and 1670, and died in 1742. Almost nothing is known of his life except that he was admitted a member of the sect of seventh-day baptists in 1691, and kept a boarding-school at Stepney. The first edition of his dictionary appeared in 1721, under the title of An Universal Etymological English Dictionary, by N. Bailey, *Philologos*. It was soon republished in an enlarged form, and altogether some thirty editions of it appeared up to 1802. Dr. Johnson made use of an interleaved copy of it when drawing up his own dictionary, and the work in its day was really a very creditable production. Bailey also published a spelling-book; All the Familiar Colloquies of Erasmus, Translated; The Antiquities of London and Westminster; Dictionarium Domesticum, &c.

BAILIFF, a name which was introduced into England with William I., and came to be applied to various officials representing or acting for the king. Thus the sheriff was the king's bailiff, and the counties were hence called *bailiwicks* (*ballivæ*). Latterly the English bailiffs have in general come to be only a kind of subordinate officers of justice. Every sheriff has some of them under him, for whom he is answerable. In some cities the highest municipal officer yet bears this name. In London the lord-mayor is at the same time bailiff. *High bailiffs* are officers appointed under the County Court Act (1888) by the judge of each county court, their duties being to attend every sitting of the court, and to serve summonses and orders, and execute warrants, precepts, and writs, which duties they either perform in person or by bailiffs appointed to assist them. In some instances the term *bailiff* in England is applied to the commanders of particular castles, as that of Dover. The term *bailie* in Scotland is applied to a magistrate of a borough, nearly corresponding with *alderman* in England.

BAILLIE, Joanna, a celebrated authoress, born in the manse of Bothwell, near Glasgow, 11th Sept. 1762, removed in early life to London, where her brother, Matthew Baillie (see next article), was settled as a physician. Here in 1798 she published the first volume of her well-known Plays on the Passions, in which she attempted to delineate the stronger passions by making each passion the subject of a tragedy and a comedy. These plays were not well adapted for the stage, and probably were never intended for it, but exhibited talent sufficient to attract much notice and give Miss Baillie a very extended reputation. Her first volume was followed up by a second volume in 1802, a third (of miscellaneous plays) in 1804, and a fourth in 1812. Other plays appeared in 1836, and a complete edition of her whole dramatic works in 1850. The only plays performed on the stage were a tragedy entitled the Family Legend, which was brought out at the Edinburgh Theatre in 1810 under the zealous patronage of Sir Walter Scott, and had a run of fourteen nights; and one of the plays on the passions entitled De Montfort, which was brought out by John Kemble, and played for eleven nights, though an attempt to revive it at a later period failed. Miss Baillie also wrote songs and miscellaneous poems. All her productions are full of genius, and breathe the true spirit of poetry. The language is simple and forcible, the female portraits are particularly beautiful, and great knowledge of the human heart is displayed in the delineations of character. In private life Miss Baillie was distinguished by the gentleness and unassuming simplicity of her manners, and possessed virtues which might have entitled her to be the representative of some of her own best heroines. After reaching the advanced age of eighty-nine, in the full possession of all her faculties, she died at Hampstead, 23rd February, 1851.

BAILLIE, Matthew, M.D., an eminent physician and anatomist, was born on the 27th October, 1761, in the manse of Shotts, Lanarkshire, Scotland. His father was the Rev. James Baillie, D.D., minister of the parish of Shotts, then of Bothwell, afterwards professor of divinity in the University of Glasgow. His sister was Joanna Baillie (see preceding article). In 1773, when in his thirteenth year, he was placed at the University of Glasgow, where he distinguished himself. In 1779 he went to Balliol College, Oxford, on the same foundation on which Adam Smith and other eminent Scotsmen had preceded him, and about the same time he commenced his medical and anatomical studies under his maternal uncles, the celebrated William and John Hunter, then lecturers in London. Some time before Dr. William Hunter's death, in March, 1783, Baillie had become his chief demonstrator and teacher of practical anatomy, and after he began to lecture on his own account he acquired the highest reputation as a teacher. In 1787 he was elected one of the physicians of St. George's Hospital, and held that office for thirteen years. In 1789 he took the degree of M.D., and was admitted a fellow of the College of Physicians. He acted as one of the commissioners for the inspection of mad-houses in 1794 and 1795.

Dr. Baillie was but little known as a physician till the year 1798, when Dr. David Pitcairn, having been compelled to repair to Lisbon for the benefit of a milder climate, Dr. Baillie was introduced to the patients of his friend, and very soon after found himself placed at the head of his profession, being applied to by the first persons of rank and fortune in the kingdom. His introduction to George III. took

place in consequence of his attending the Duke of Gloucester during his last illness, and on the first vacancy, which happened in 1810, he was nominated one of his majesty's physicians in ordinary. His professional income at the height of his practice is said to have amounted to some £10,000 per annum. His work on The Morbid Anatomy of Some of the Most Important Parts of the Human Body (1795) had previously made him well known over the whole continent, and the reputation he had acquired, not only for consummate anatomical knowledge, but for sound and unerring judgment in the distinction of obscure, intricate, and doubtful cases of internal disease, joined to his quiet, unobtrusive, and gentle manners, gave an authority and weight to all his opinions, particularly amongst his professional brethren, which was quite unprecedented. Dr. Baillie died at Duntisbourne House, near Cirencester, in Gloucestershire, on the 23rd Sept. 1823, in the 62nd year of his age. Besides the two works noticed, Dr. Baillie published an anatomical description of the gravid uterus, and two other anatomical papers in the Transactions of the Royal Society for the years 1788 and 1789. He also published eleven essays in the Transactions of the Society for the Promotion of Medical and Chirurgical knowledge, and seven papers in the Medical Transactions, published by the London College of Physicians.

BAILLIE, Robert, D.D., an eminent and learned Scottish Presbyterian clergyman and author, was born at Glasgow in 1599. He studied arts and divinity in the university of his native city, and received orders in 1622, from Archbishop Law, of Glasgow. Having become tutor to the son of the Earl of Eglinton, he was presented by him to the parish church of Kilwinning. He was also admitted a regent or professor in the university of Glasgow. About this period he appears to have diligently prosecuted the study of the oriental languages. Though educated and ordained as an Episcopalian, he resisted the attempt of Archbishop Laud to establish the use of his Prayer-Book in Scotland, and joined the Presbyterian party. In 1638 he represented the presbytery of Irvine in the General Assembly at Glasgow, which, in defiance of the royal authority, abolished Episcopacy in Scotland. In the ensuing year when it was found necessary to vindicate the proceedings of the Assembly with the sword, Baillie entered heartily into the views of his countrymen. He accompanied the Covenanting army to Dunse Law as preacher to the Earl of Eglinton's regiment. This expedition ended in a treaty between the Scottish leaders and their sovereign, in terms of which hostilities ceased for a few months. On the renewal of the war next year Baillie accompanied the Scottish army on its march into England, and became the chronicler of its transactions. Towards the end of the year 1640 he was selected by the Scottish leaders to go to London, with other commissioners, to prepare charges against Archbishop Laud for his innovations upon the Scottish Church, which were alleged to have been the origin of the war. He had, in April, before the expedition, published pamphlets entitled Laudensium Autokatakrisis: and the Canterburian's Self-Conviction; or an Evident Demonstration of the Avowed Arminianisme, Poperie and Tyrannie of that Faction, by their own Confessions, which perhaps pointed him out as fit to take a lead in the prosecution of the great opponent of Scottish presbyterianism. Of this, and almost all the other proceedings of his public life, he has left a minute account in his letters and journals, which are preserved entire in the archives of the Church of Scotland, and in the University of Glasgow, and of which a very full edition was published by the Wodrow Society. Not long after his return to his native country, in 1642, he was appointed joint professor of divinity at Glasgow, along with David Dickson. He was a member of the Westminster Assembly of Divines, and attended its sittings from 1643–46. In the year 1649 he was chosen by the church to carry its homage to King Charles II. at the Hague, and to invite that monarch to assume the government in Scotland, under the limitations and stipulations of the Covenant. After the Restoration, though made principal of his college through court patronage, he did not hesitate to express his dissatisfaction with the re-introduction of Episcopacy. He died July, 1662, in the 63rd year of his age. Besides writing extensively on ecclesiastical subjects Baillie was the author of a learned work entitled Opus Historicum et Chronologicum, which was published in folio at Amsterdam. His Letters and Journals (1637–62) are among the most valuable historical records of his time. The best edition is that of the Bannatyne Club, 1841–42, edited by David Laing. He was a man of extensive learning—understood no fewer than thirteen languages, among which were Hebrew, Chaldee, Syriac, Samaritan, Arabic, and Ethiopic.

BAILLIE, Robert, of Jerviswood, a distinguished Scottish patriot of the reign of Charles II., was the son of George Baillie of St. John's Kirk, in Lanarkshire. The date of his birth is not known, but when circumstances first brought him into notice he had arrived at full manhood. During the administration of the Duke of Lauderdale, and in the year 1676, an informer named Carstairs, hired by Archbishop Sharp to ferret out Nonconformists, arrested a brother-in-law of Baillie, the Rev. Mr. Kirkton of Edinburgh. There was no charge against him, and Carstairs had no warrant to apprehend him; but knowing him to be a Nonconformist, he purposed extorting money from him. Kirkton succeeded in getting a person in the house to which he had been conducted to go and inform Baillie of his situation. On arriving before the house accompanied by several friends, Baillie, hearing the sounds of a struggle going on inside, burst open the door, and found Carstairs sitting upon Mr. Kirkton, on the floor. The informer had no warrant to show, and Baillie thought himself justified in taking his friend along with him. Smarting under his defeat, Carstairs, through the influence of Sharp, obtained an antedated warrant, signed by nine councillors, and Baillie and his friends were thereupon charged with engaging in a tumult against the government. Rather than pay the fine of 6000 merks (£334) imposed upon him, Baillie went to prison, but was released at the end of four months, consenting to pay Carstairs the half of the fine. In 1683 Baillie went to London in furtherance of a scheme of emigration to South Carolina taken up by a number of Scottish gentlemen, as being the only way of escaping the tyranny of the government. He became associated with Monmouth, Sydney, Russell, and the rest of that party, a small number of whom got up a plot for assassinating the king. It was discovered; Sydney and Russell, though innocent, were condemned, and Baillie with several other gentlemen were sent down to be tried in Scotland. After a long imprisonment, during which vain attempts were made to obtain evidence against him, he was brought before the Court of Justiciary, was found guilty, and condemned to be executed the same afternoon, 24th Dec. 1684. The unfortunate gentleman was so weak that he had to be assisted to mount the ladder, but he betrayed no sign of moral weakness.

BAILLY, Jean Sylvain, an eminent French astronomer and statesman, born at Paris, 1736. Though

designed by his father, keeper of the Royal Gallery of Pictures, for a painter, he followed his natural inclination for literature. His first attempts were in poetry. Becoming afterwards acquainted with Lacaille, he was induced by his instructions and example to devote himself to astronomy. After the death of Lacaille in 1753, he entered the Academy and published the calculation of a great many of Lacaille's observations on the stars of the zodiac. He undertook, also at this time, a great work on the satellites of Jupiter, the theory of which the Academy had made a prize question. His Essai sur la Théorie des Satellites de Jupiter, avec des Tables de leurs Mouvements, appeared in 1766. In 1771 he published a treatise on the light reflected by the satellites of Jupiter, which he undertook to measure by an ingenious process. Amidst these laborious occupations he never lost his love of literature. His eulogiums on Pierre Corneille, Leibnitz, and others, were so favourably received that he resolved to select a scientific subject, susceptible of the ornaments of style which might secure his literary fame. He chose the History of Astronomy (1775 to 1787, five vols. quarto). It met with general approbation, which was increased by the discussions that succeeded between the author and Voltaire, which led Bailly to publish his Lettres sur l'Origine des Sciences, et sur l'Atlantide de Platon. In 1784 the French Academy elected him a member in the place of Tressan, and in 1785 he was admitted into the Academy of Inscriptions. The government also made him a member of the committee for examining the character and influence of animal magnetism discovered by Mesmer. Bailly delivered a double report, one for the public, to give it a just view of the doctrine, the other for the king, on the real causes of magnetism, and its moral influence. The latter was not published till a later period. When the revolution tore him from his peaceful pursuits Paris chose him, May 12, 1789, first deputy of the *tiers-état;* in the assembly itself he was made first president. He retained this place after the commons had declared themselves a national assembly; and when the king forbade them to assemble, he presided, June 20, 1789, in the session of the tennis court, when all the deputies swore never to separate till they had given France a new constitution. Being chosen mayor of Paris, July 16, he discharged the duties of his office with his usual integrity and disinterestedness; but these virtues were not sufficient to restrain a furious populace. The palliatory measures employed by Bailly to preserve the appearance of tranquillity might delay the eruption, but could not suppress it. Once only he had recourse to rigorous measures. This was after the return of the king from Varennes. The violent revolutionists wished to seize this opportunity for his deposition, and a great number of them assembled, July 17, 1791, in the Champ-de-Mars, in order to sign a petition to this effect. Bailly, accompanied by the national guards, commanded the rebels to disperse, and on their refusal dispersed them by force. The national assembly approved of his conduct; nevertheless he resigned his place, Sept. 19, 1791. Bailly retired entirely from public affairs to the country in the vicinity of Nantes. When the increasing troubles left him no security even here, his friend Laplace offered him a shelter in his own house at Melun. In the meantime, by the events of May 31, 1793, circumstances were changed, and a division of the revolutionary army entered Melun. Laplace informed Bailly of his danger; unfortunately he did not regard the warning, but persisted in going to Melun. As soon as he entered this place he was known. He was sent to Paris, where, Nov. 11, 1793, he was condemned to death by the revolutionary tribunal, and executed on the 12th. He died with the utmost composure. His crimes were his conduct on the Champ-de-Mars, and the boldness with which he had declared the accusations brought against the queen false and calumnious. His posthumous works are, Essai sur l'Origine des Fables, et des Religions Anciennes, and his Journal during the early period of the revolution, from April 21 to Oct. 2, 1789 (three vols. 1804).

BAILMENT, in law, is the delivery of a chattel or thing to another to keep, either for the use of the bailer or person delivering, or for that of the bailee or person to whom it is delivered. A bailment always supposes the subject to be delivered only for a limited time, at the expiration of which it must be redelivered to the bailer; and the material inquiries, in cases of bailment, relate to the degree of responsibility of the bailee in regard to the safe-keeping and redelivery of the subject of the bailment. This responsibility will depend, in some degree, upon the contract on which the bailment is made. If a thing is delivered to the bailee to keep without any advantage or use to himself, or any compensation, but merely for the benefit of the bailer, he is answerable only for gross negligence; but if the bailment is for the mutual benefit of both parties, the thing must be kept with the ordinary and usual care which a prudent man takes of his own goods; but if it be delivered for the benefit of the bailee only, he must exercise strict care in keeping it, and will be answerable for slight negligence. A special agreement is made in many cases of borrowing or hiring, specifying the risks assumed by the borrower or hirer; and in such case his obligations will be determined by his stipulations. Pledging and letting for hire are species of bailment. There is an excellent essay on the Law of Bailment by Sir William Jones.

BAILY, Francis, a distinguished astronomer, born at Newbury, in Berkshire, in 1774; entered a London house of business, travelled two years in America, and then settled in London as a stockbroker in 1802. While thus actively engaged he published tables for the purchasing and renewing of leases, the doctrine of interest and annuities, the doctrine of life annuities and assurances, and an epitome of universal history. On retiring from business with an ample fortune in 1825 he turned his attention particularly to astronomy, and became one of the founders of the Astronomical Society. Many of his papers enrich its Transactions. In 1835 he published a life of Flamsteed. He died in 1844.

BAILZIE, or Baillie, William, a physician of the 15th century, a native of Scotland. After being educated in his native country he went to Italy, where he studied medicine with such reputation as to be made rector, and afterwards professor of medicine in the University of Bologna about the year 1484. In his theory he adopted the Galenic system in preference to the Empiric, and wrote Apologia pro Galeni doctrina contra Empiricos (Lyons, 1552, 8vo). Mackenzie thinks that he also wrote a book entitled De Quantitate Syllabarum Græcarum, et de Dialectis (1600, 8vo).

BAINBRIDGE, John, an eminent astronomer and mathematician, born at Ashby-de-la-Zouch, in Leicestershire, in 1582. He studied at Cambridge, whence, having taken the degree of M.A., he returned to his native place, set up a grammar-school, and at the same time practised physic, devoting his leisure to the science of mathematics. He at length removed to London, and was admitted a fellow of the College of Physicians. A Description of the Comet of 1618, which he published, was the means of introducing him to Sir Henry Savile, who had founded an astronomical lecture at Oxford, and who in 1619 appointed Dr. Bainbridge to the professorship. He

then entered as a master commoner at Merton College, where in 1631 he was nominated reader of Linacre's medical lecture. He died in 1643, while engaged in publishing corrected editions of the works of the ancient astronomers, an undertaking which was one of the duties enjoined on him as Savilian professor. His only published works besides that already mentioned are—Procli Sphæra et Ptolemæi de Hypothesibus Planetarum, together with Ptolemæi Canon Regnorum (1620, 4to); and Canicularia, A Treatise on the Dog Star (1648). He left some astronomical dissertations, and various other manuscripts, which are preserved in the library of Trinity College, Dublin.

BAIRAM, or Beiram, the Easter of the Mohammedans, which follows immediately after the Ramadan or Lent (a month of fasting), and lasts three days. This feast begins, like the Ramadan, as soon as the new moon is announced by the persons appointed for that purpose, and during the course of thirty-three years makes a complete circuit of all the months and seasons, because the Turks reckon by lunar years. It is the custom at this feast for inferiors to make presents to their superiors. This custom formerly extended even to the Europeans, who were obliged to make presents to men of rank, to the pashas and the cadis. The Sultan of Turkey is also accustomed to distribute favours and presents. Sixty days after this first great Bairam begins a second—the lesser Bairam. They are the only two feasts the celebration of which the Mohammedan religion prescribes to the faithful.

BAIRD, The Right Honourable General Sir David, a distinguished British commander, was born at Newbyth, Haddingtonshire, 6th December, 1757. He entered the army December 16, 1772, as an ensign in the second foot, joined the regiment at Gibraltar, April, 1773, and returned to Britain in 1776. Having been promoted to a lieutenancy in 1778, he immediately after obtained a company in the 73rd (afterward turned into the 71st), with with which he sailed for India, and arrived at Madras, January, 1780. He distinguished himself as a captain in the war against Hyder Ali, and at the disastrous engagement at Perambocum, 10th Sept. 1780, in which the small British force engaged was nearly all cut to pieces after surrendering, his life was saved through the protection of the French officers to whom he had surrendered; but he remained a prisoner, shut up in the fortress of Seringapatam, and endured many hardships inflicted by savage vindictiveness for four years. Having again joined his regiment he attained the rank of major in 1787, and in October, 1789, he obtained leave of absence and returned to Britain. In 1791 he returned as lieutenant-colonel of the 71st, and joined the army under the Marquis Cornwallis. As commander of a brigade of Sepoys he was present at the siege of Seringapatam, in 1791 and 1792; and likewise at the storming of Tippoo Saib's lines in the island of Seringapatam. In 1793 he commanded a brigade of Europeans, and was present at the siege of Pondicherry. He received a colonelcy in 1795. In October, 1797, he embarked at Madras with his regiment for Europe. In December, when he arrived at the Cape of Good Hope, he was appointed brigadier-general, and placed in command of a brigade of troops there. On June 18, 1798, he was appointed major-general, and returned to India. In January, 1799, he arrived at Madras in command of two regiments of foot, together with the drafts of the 28th dragoons. May 4 he commanded the storming party at the assault of Seringapatam; when, in requital of his brilliant services, he was presented by the army, through the commander-in-chief, with the state sword of Tippoo Saib, and also with a dress-sword from the field-officers serving under his immediate command at the assault. Baird's eminent merit being now fully known to the government at home, he was in 1800 appointed to command an expedition to Egypt. He landed at Cosseir in June, 1801, crossed the desert, and embarking on the Nile, descended to Grand Cairo; whence he set out for Alexandria, which he reached a few days before it surrendered to General Hutchinson. Next year he returned to India and received an important command; but being soon after superseded by Sir Arthur Wellesley (Wellington), he sailed for Britain and arrived in England in Nov., 1803. In June, 1804, he received the honour of knighthood, and on the 18th of August following became a Knight Companion of the Bath. With the increased rank of lieutenant-general he commanded an expedition which sailed in October, 1805, for the Cape of Good Hope. Landing there January 6, 1806, he attacked and beat the Dutch army, and on the 18th received the surrender of the colony. Being recalled, he arrived in Britain, April, 1807, and was shifted from the colonelcy of the 54th, which he had held for some years, to that of the 24th, and placed on the foreign staff under General Lord Cathcart. He commanded a division at the siege of Copenhagen, where he was twice slightly wounded. After a short period of service in Ireland Sir David sailed in command of an armament of 10,000 men for Corunna, where he arrived in November, 1808, and formed a junction with Sir John Moore. He commanded the first division of Moore's army, and in the battle of Corunna, January 16, 1809, he lost his left arm. By the death of Sir John Moore Sir David succeeded to the chief command. On communicating intelligence of the victory to government he received for the fourth time the thanks of Parliament, and was created a baronet, with armorial bearings allusive to the transactions of his life. In 1814 he was promoted to the rank of general, and in 1819 became governor of Kinsale, next year commander of the forces in Ireland, and in 1827 of Fort George in Scotland. He died, August 18, 1829, at his seat of Ferntower, in Perthshire. A monument to his memory was erected by his widow on the top of a romantic hill named Tom-na-chaistel, in the neighbourhood of Ferntower. The Life of Sir David Baird, written by Theodore Hook, was published in 1832.

BAIREUTH or Bayreuth, a handsome town of Bavaria, on the Red Main, pleasantly situated 41 miles north-east of Nürnberg. The principal edifices, besides churches, are the old palace now occupied by public offices, the new palace, with garden and park open to the public; the opera-house, a gymnasium, and the national theatre, constructed after the design of the celebrated composer Wagner, and opened in 1876 with a grand performance of his Ring of the Nibelungen. The industries are cotton and flax spinning and weaving, sugar-refining, brewing, granite polishing, &c. In the cemetery a monument has been erected to Jean Paul F. Richter, who died here; and in the vicinity are chateaux with fine gardens, forming a favourite resort of the inhabitants. Baireuth fell to the Burgrave of Nürnberg in 1248, and after many vicissitudes was ceded to Bavaria in 1810. Pop. in 1890, 24,364; in 1910, 34,481.

BAIUS, or De Bay, Michael, born 1513, at Melin, near Ath, in Hainaut, educated at Louvain in 1551, made professor of theology at this university in 1563 or 1564, chosen a member of the Council of Trent, was one of the greatest theologians of the Catholic Church in the sixteenth century. He founded systematic theology directly upon the Bible and the Christian fathers, leaving the scholastic method. He had read the writings of St. Augustine nine times, and had fully adopted the views of that father. The doc-

trines that the human will, when left to itself, could only sin; that even the mother of Jesus was not free from hereditary and actual sin; that every action which did not proceed from pure love to God was sinful; and that no penance was effectual for the justification of the sinner, but everything was to be attributed solely to the grace of God, through Christ,—caused him to be persecuted as a heretic by the old Scotists, and, in particular, by the Jesuits, who, notwithstanding the favour in which he stood at the Spanish court, at length succeeded in obtaining a papal bull in 1567, condemning these doctrines with others falsely imputed to him. Baius submitted; yet the persecutions against him still continued, as did also his defence of the opinions of Augustine in his lectures; and as the theological faculty at Louvain was entirely in his favour, he not only remained in the quiet possession of his dignities, but was also appointed dean of St. Peter's in 1575, and in 1578 chancellor of the university; nay, the King of Spain conferred upon him the office of inquisitor-general in the Netherlands. He died in 1589, and left the reputation of great learning, pure morals, and a rare modesty. His Augustinian views, which were called then *Baianism*, descended to the Jansenists, as the precursor of whom he is to be regarded, and in their hands received vindication formidable to Jesuitism. His doctrine of pure undivided love to God has also been adopted by the Quietists. His writings, mostly polemical, were published at Cologne, 1696, 4to.

BAJAZET I. (or BAYAZID I.), Turkish emperor, in 1389 succeeded his father Murad or Amurath, who fell in the battle of Kossova against the Servians. He caused his brother Jacob, his rival for the throne, to be strangled—an act of barbarity which, since his time, has become a custom at the Turkish court. He made great and rapid conquests. Hence his name *Ilderim*, the Lightning. In three years he conquered Bulgaria, part of Servia, Macedonia, Thessaly, and subjected the states of Asia Minor. He even besieged Constantinople for ten years, hoping to starve it into surrender. In order to save the city King Sigismund of Hungary (afterwards emperor of Germany) assembled a great army (including a number of French troops, and 2000 noblemen under the command of the Duke of Nivey), and attacked the city of Nicopolis, in Bulgaria, situated near the Danube. But Bajazet met them and obtained a decisive victory over the allied Hungarians, Poles, and French in 1396. Sigismund escaped, by a hasty flight, in disguise. The French, by whose imprudent impetuosity the battle was lost, were most of them taken prisoners and executed by the order of Bajazet. He would probably have now overturned the whole Greek Empire if Timur (see TAMERLANE) had not overrun Asia Minor in 1400. Bajazet marched to meet him, and suffered a total defeat near Ancyra, in Galatia, June 16, 1402. He himself fell into the power of the conqueror, who treated him with generosity. The story of his being carried about in a cage by Timur is without historical proof. Bajazet died in 1403 in Timur's camp, in Caramania. His successor was Soliman I.—BAJAZET II. succeeded his father, Mohammed II., sultan of the Turks, in 1481. He increased the Turkish Empire by conquests on the north-west, and in the east, took Lepanto, Modon, and Durazzo, in a war against the Venetians, and ravaged the coasts of the Christian states on the Mediterranean, to revenge the expulsion of the Moors from Spain. At home he had to contend against his rebellious son Selim, to whom at last he resigned the empire. He died in 1512 on his way to the place which he had chosen for his retirement. It has been supposed that he was put to death by the order of his son. He was a man of uncommon talents, and did much for the improvement of his empire and the promotion of the sciences.

BAKER, HENRY, English poet and naturalist, was born on May 8th, 1698. He was a native of London, and devoted himself to the instruction of persons born deaf and dumb, by which he acquired a handsome fortune. In 1725 and 1726 he published Original Poems, serious and humorous, in two parts. He was also the author of The Universe, a poem, and an Invocation to Health. He afterwards employed himself much in experimental philosophy, and making microscopical observations. In 1740 he was chosen a fellow of the Royal and Antiquarian societies, and in 1744 he obtained the Copley medal for his microscopical discoveries on crystallization. He contributed many papers to the Philosophical Transactions; and he was an active member of the Society for the Encouragement of Arts, to which he for some time acted gratuitously as secretary. He died on Nov. 25th, 1774. By his will he left £100 to the Royal Society, for an annual lecture on chemistry or natural philosophy. Besides the works already noticed, he published The Microscope Made Easy, and Employment for the Microscope; both illustrated by plates, and containing much curious information. Mr. Baker married a daughter of Daniel Defoe, by whom he had two sons. The elder, David Erskine Baker, who died in 1767, was the author of The Companion to the Playhouse, two vols. 12mo; afterwards enlarged by Isaac Reed and Stephen Jones. Henry Baker, the younger son, who was an attorney, had some talent for poetry, and in 1756 published Essays, Pastoral and Elegiac, two vols. 8vo.

BAKER, SIR RICHARD, an English historian, born of a good family in Kent in 1568. He became a gentleman commoner in Oxford University, whence he removed to one of the inns of court, and afterwards travelled on the Continent. Returning home he was knighted in 1603 by James I. In 1620 he filled the office of high sheriff of Oxfordshire, having estates in that county. An unfortunate marriage with the daughter of Sir George Mainwaring, of Ightfield, in Shropshire, occasioned his ruin; for giving security for the debts contracted by that family he became insolvent, and was obliged to take refuge in the Fleet prison, where, after continuing some years, he died in 1645. He lightened his tedious confinement by turning author. Some religious pieces which he published were speedily consigned to oblivion; but his Chronicle of the Kings of England, first published in 1643, and afterwards continued by Edward Phillips, the nephew of Milton, and others, went through a great number of editions. Addison, in the Spectator, represents it as the favourite manual of Sir Roger de Coverley; as it seems to have been, in fact, of country gentlemen in general for a considerable period.

SUPPLEMENT.

AALEN, a town of Germany, in Würtemberg, 30 miles to the north of Ulm. It has manufactures of woollens, railway works, &c., and there are iron-works in the neighbourhood. Pop. (1905), 10,442.

AASVÄR, a group of small islands off the Norwegian coast, under the Arctic Circle, where there is an important December herring-fishery. About 10,000 fishermen are said to congregate here, and for three weeks or so the fishery is carried on with great assiduity.

AB, the eleventh month of the Jewish civil, the fifth of the ecclesiastical year, corresponding to part of July and part of August.

ABABDÈH, a nomadic African race inhabiting Upper Egypt and part of Nubia, between the Nile and the Red Sea. They are of Hamitic stock, and are thus akin in race to the ancient Egyptians. They are dark-brown in colour, and Mohammedans in religion.

ABACO, GREAT and LITTLE, two islands of the Bahamas group. The former, which is among the largest of the Bahamas, is about 80 miles long but very narrow. Little Abaco is much smaller. Together they have a population of about 2400.

ABBADIE, ANTOINE THOMSON and ARNAUD MICHEL D', French travellers and brothers, were born in Dublin in 1810 and 1815 respectively. They were educated in France, spent a number of years in Abyssinia, and published works throwing much light on that country; by Arnaud, Douze ans dans la Haute-Éthiopie; by Antoine (who was elected a member of the Academy in 1867), Géodésie d'Éthiopie; Dictionnaire de la Langue Amarinna; Géographie de l'Éthiopie, &c. Michel died in 1893, Antoine in 1897.

ABBOTT, THE REV. EDWIN, M.A., D.D., was born in London on the 20th December, 1838, his father being Edwin Abbott, head-master of the Philological School. He received his early education at the City of London School, from which he proceeded to St. John's College, Cambridge. His career there was a brilliant one: amongst other distinctions he gained the chancellor's classical medal in 1861, and became a fellow of his college in the following year. After being a master in King Edward's School, Birmingham, and at Clifton College, he was appointed in 1865 to the headmastership of the school where he had received his early training. This post he held till his resignation in 1889, and during the twenty-four years of his rule the City of London School attained a high reputation. He was select preacher at Cambridge on two occasions, and once, in 1877, at Oxford; in 1876 he was appointed Hulsean lecturer at the former university. Many important works on theological and educational subjects have come from his pen, and some of them have become leading authorities in their respective departments. Those dealing with theology include Through Nature to Christ (1877), a statement of the author's conception of the Christian religion; Bible Lessons (1872); Cambridge Sermons (1875); and Oxford Sermons (1879). He is also the author of the elaborate article Gospels in the ninth edition of the Encyclopædia Britannica, and co-author with Mr. W. G. Rushbrooke of The Common Tradition of the Synoptic Gospels (1884). Amongst his well-known educational works are Shakespearian Grammar (1870); How to Write Clearly (1872); How to Tell the Parts of Speech, and How to Parse (1875); Latin Prose through English Idiom (1873); an edition of Bacon's Essays (1876); Via Latina (1880); The Latin Gate (1889); and Dux Latinus (1893). Three biographical works—Bacon and Essex; Francis Bacon, an Account of his Life and Works; and The Anglican Career of Cardinal Newman—appeared respectively in 1877, 1885, and 1892. In Philomythus, published in 1891, Newman's views on ecclesiastical miracles are adversely reviewed. The two romances Philochristus (1878) and Onesimus (1882), and The Kernel and the Husk (1886), were issued anonymously, as was also his Flatland, or a Romance of Many Dimensions (1884). In 1898 appeared St. Thomas of Canterbury, his Death and Miracles, while his later works include Clue, a Guide through Greek to Hebrew Scripture (1900); From Letter to Spirit (1903); Paradosis (1904).

ABD-EL-KADER (properly SIDI EL HADJI ULED MAHADDIN), third son of an influential chief of the province of Oran, Algeria, was born near Mascara in 1807. In 1830, when Charles X. of France undertook the expedition which was to prove the first step in the conquest of Algeria, Abd-el-Kader, on account of his already recognized brilliant talents and warlike skill, was elected chief by several important tribes, in the hope that he would avert the ruin of his country. Shortly afterwards he was proclaimed emir of Mascara, and the French soon found it expedient to sign a treaty which recognized his sovereignty over Oran. Being resolved to extend his sway he became embroiled with the French, and for more than ten years carried on a fierce and sanguinary war, being at last only conquered by the superior numbers and arms of the enemy. In 1842 he was compelled to take refuge in Marocco, where he soon gathered round him a large force, with which he waged an incessant guerrilla war until 1847, when he was obliged to surrender to Gen. Lamoricière. Instead of being allowed to retire to Egypt, as he had stipulated, he was first confined at Pau and then at the Château d'Amboise, whence he was released by Napoleon III., and was granted a pension of £4000. He at first took up his residence at Brussa, then at Constantinople, and finally at Damascus. He openly befriended the Christians at the time of the Syrian massacres (1860), and offered his services to the French against the Germans in 1870. He visited Paris and London in 1867. His death took place at Damascus on the 25th May, 1883.

ABDUL-HAMID, Sultan of Turkey, younger son of Abdul-Mejid, born in 1842, succeeded his brother Murad V., who was deposed on proof of his insanity in 1876. At that time Turkey, which was at war with Servia, was compelled to agree to an armistice at the demand of Russia. The persecution and oppression of the Christian population of Bulgaria had roused remonstrances from other European countries, and a congress met at Constantinople to consider a constitution which the Porte had proclaimed. The conference was a failure, and in April, 1877, war was declared by Russia. During the sanguinary struggle which ensued the Turks fought with great bravery, but they had ultimately to sue for peace. A treaty was signed at San Stefano in Feb. 1878, but its provisions were modified by a congress of the great powers which met at Berlin. Turkey was compelled to part with some of its choicest provinces, while the sultan also ceded the island of Cyprus to be occupied and administered by Britain, which in turn agreed to guarantee his Asiatic dominions to the sultan. Abdul-Hamid's reign was further disturbed in 1885 by a revolution in Eastern Roumelia, and it was latterly stained by the massacre of many thousands of Armenians. In April, 1897, war was declared against Greece. The question at issue concerned the government of Crete, and after the Turkish arms had asserted their supremacy, the sultan was permitted by the powers to retain the island, though in 1898 they insisted on the withdrawal of the Turkish troops. The sultan's misrule at last made him generally unpopular, and by the 'Young Turk' movement in 1908 he was dethroned in favour of a brother, and sent to Salonica to be kept there in custody.

ABELITES, Abelians, a religious sect in Northern Africa which arose in the fourth century after Christ. They married, but lived in continence, after the manner, as they maintained, of Abel, and attempted to keep up the sect by adopting the children of others. The sect soon disappeared as a separate body.

ABELMOSCHUS, a genus of tropical plants of the mallow family. *A. esculentus*, cultivated in India, Algeria, &c., yields edible pods, and also a valuable fibre. The fruit, called *okro* or *ochro*, is used in soups. These plants are now often placed in the genus Hibiscus (which see).

ABERSYCHAN, an urban sanitary district (or town) of England, in Monmouthshire, comprising four distinct villages, namely Abersychan, Pontnewynyth, Garn, and Talywain—Abersychan (about 10 miles north from Newport) being in the centre and the largest of the group. Its prosperity is due to its being in the middle of a rich coal-mining district. Pop. (1881), 13,496; (1901), 17,768.

ABHORRERS, in English history, a name given to the court party in 1679–80, who, on petitions being presented to Charles II. praying him to summon parliament, signed counter-petitions expressing *abhorrence* for those who were thus attempting to encroach on the royal prerogative. They may be regarded as an early form of the Tory party, just as the *petitioners* represented the beginning of Whiggism.

ABIB, the first month of the Jewish ecclesiastical year and the seventh of the civil year, corresponding to the latter part of March and the first of April. It is also called *Nisan*.

ABKASIA, a fertile Russian district, at the western extremity and south of the Caucasus, between the mountains and the Black Sea. The Abkasians form a race distinguished from their neighbours in various respects. At one time they were Christians, but latterly adopted Mohammedanism. Recently many of them have migrated into Turkish territory.

ABOUT, Edmond François Valentin, a French novelist and miscellaneous writer, was born at Dieuze, dep. of Meurthe, on the 14th February, 1828. His father, a country magistrate, destined him for the church, and he was accordingly sent to the Roman Catholic seminary of Pont-à-Mousson at the age of twelve. From that establishment he was soon expelled for arguing irreverently with his teachers on questions of dogma. He then entered the Lycée Charlemagne, where he carried off, year after year, the first prizes of his form, and in 1848 gained the highest prize for Latin composition, which entitled him to join the Normal School at state expense. In 1851 he was appointed a professor in the French school at Athens, but quitted that poorly-paid office at the end of two years. Shortly afterwards he published his first important work, La Grèce Contemporaine, a slashing prose satire on the manners, morals, and political squabbles of the modern Greeks. His first novel, Tolla, appeared in the Revue des Deux Mondes, and was published separately in 1855. A cry was raised against the author for plagiarism, the best things in his book, it was asserted, being stolen from an Italian novel Vittoria Savorelli. About's defence, that he had already sufficiently acknowledged his indebtedness to this book, was not generally considered satisfactory. Soon after he was engaged in contributing to the Moniteur a series of tales, Les Mariages de Paris; and in 1856 he made his second attack on the modern Greeks in a bright and amusing novel, Le Roi des Montagnes, in which a brigand chief is represented as being in league with Athenian politicians as well as the military. Two years later he issued his famous pamphlet, La Question Romaine, in which he condemned the French support of the Vatican. By this time he had become both a frequent visitor to the court of Napoleon III. and a busy journalist, yet novel followed novel in quick succession. We can only mention the names of the more important of these: Germaine (1857), Trente et Quarante (1858), L'Homme à l'Oreille Cassée (1861), Le Nez d'un Notaire (1862), Le Cas de M. Guérin (1862), Madelon (1863), La Vieille Roche (1865–6), Le Turco, a tale of military life in Algeria (1866), Le Fellah, a novel of Egyptian life (1868). As the results of his study of social and political subjects he published Le Progrès (1864), L'A B C du Travailleur, La Nouvelle Carte d'Europe, La Prusse en 1860, Rome Contemporaine, &c. He also wrote several dramas which had little success on the stage. He acted as war correspondent for the Soir in Alsace in the Franco-German war. The later years of his life were mainly devoted to journalism. He died on the 17th January, 1885.

ABRAHAM-MEN, originally a set of mendicant lunatics from Bethlehem Hospital, London, who were allowed to wander about and receive alms from the charitable; but as many worthless characters assumed, without right, the badge worn by them the term came to signify an impostor who travelled about the country seeking alms, under the pretence of lunacy. The phrase *to sham Abraham* was once quite common.

ABRAMIS, a genus of fishes. See Bream.

ABRIN, or Abrine, the active principle in the seeds of the plant *Abrus precatorius* (see Abrus), a poisonous substance obtained in the form of a brownish-yellow powder. A very minute quantity directly introduced into the blood by means of an aqueous solution is fatal to many animals, though some are said to be naturally immune. It is employed in ailments of the eyes, and also as a remedy for lupus and diseases of the skin.

ABROMA, a genus of small trees, of the family Sterculiaceæ, natives of India, Java, &c., one species of which, *A. augusta*, a native of India, has a bark

yielding a strong white fibre, from which good cordage is made.

ABSORPTION, in physiology, one of the vital functions by which the materials of nutrition and growth are absorbed and conveyed to the organs of plants and animals. In vertebrate animals this is done by the lymphatics and lacteals, in plants chiefly by the roots. See ABSORBENT.

In physics, *absorption of colour* is the phenomenon observed when certain colours are retained or prevented from passing through transparent bodies: thus pieces of coloured glass are almost opaque to some parts of the spectrum, while allowing other colours to pass through freely.

ABU, a granitic mountain of India in Sirohi state, Rajputána, rising precipitously from the surrounding plains, its top forming a picturesque and varied tract 14 miles long and 2 to 4 broad; highest point, 5653 ft. It is a hot-weather resort of Europeans, and is the site of two most beautiful Jain temples.

ABU KLEA, a group of wells, surrounded by steep, black mountains, about 120 miles from Khartoum, in the Eastern or Egyptian Soudan, where, on the 17th January, 1885, Sir Herbert Stewart, with 1500 men, defeated the Mahdi's troops, numbering 10,000.

ABUTILON, a genus of plants, of the order Malvaceæ or mallows, sometimes called Indian mallows, inhabiting the East Indies, Australia, Brazil, Siberia, &c. Several of them yield a valuable hemp-like fibre, as *A. indicum* and *A. avicennæ*. The latter, now a troublesome weed in the Middle United States, has been recommended for cultivation, and is sometimes called American jute.

ACARIDA, a division of the Arachnida, including the mites, ticks, and water-mites. Their abdomen is not divided into segments, and is not distinctly marked off from the cephalothorax. Their respiration is usually tracheal. See MITE.

ACAROID RESIN, or AKAROID GUM, a resin which exudes so abundantly from the grass-trees (*Xanthorrhœa*) of Australia as to cover the base of the leaves and the underground portions of the plants, and is also obtained by crushing and sifting or washing, as much as 50 lbs. or 60 lbs. being obtained from one plant. Two kinds, the red and the yellow, are generally distinguished, and they are used in varnishes and for other purposes.

ACCADIANS, the primitive inhabitants of Babylonia, who had descended from the mountainous region of Elam on the east, and to whom the Assyrians ascribed the origin of Chaldean civilization and writing. This race is believed to have belonged to the Turanian family, or to have been at any rate non-Semitic. What is known of them has been learned from the cuneiform inscriptions. Accad is mentioned in the Old Testament as one of the cities in the land of Shinar. See ASSYRIA.

ACCOUNTANT, a person whose chief business is with accounts and the drawing up of financial statements and balance-sheets. An accountant is an important official in banks and certain other institutions, and in the United Kingdom many persons carry on the business of accountant as a distinct profession, auditing books for merchants, joint-stock companies, and the like, winding up bankrupt estates, &c. There are several bodies of accountants incorporated by royal charter, and hence specially distinguished as chartered accountants ('C.A.'). Members are admitted after passing a somewhat searching examination.

ACCUMULATOR, a name applied to a kind of electric battery by means of which electric energy can be stored and rendered portable. In the usual form each battery forms a cylindrical leaden vessel, containing alternate sheets of metallic lead and minium wrapped in felt and rolled into a spiral wetted with acidulated water. On being charged with electricity the energy may be preserved till required. Other forms are also in use.

ACETABULUM, an anatomical term applied to any cup-like cavity, as that of a bone to receive the protuberant end of another bone, the cavity, for instance, that receives the end of the thigh-bone.

ACETYLENE, C_2H_2, a colourless gas slightly soluble in water, and burning with a white flame. It is produced by the electric arc between carbon points placed in hydrogen, but for practical use as an illuminant it is obtained by the action of water on calcium carbide. As a lighting agent it has several advantages over coal-gas. Its illuminating power is 240 candles, whereas that of coal-gas, which contains a small percentage of acetylene, is only 16, and its flame is one of intense brilliancy. It can be manufactured also at comparatively small cost. Against these undoubted advantages may be set the danger of explosion attendant on its use; but this seems in practice to be easily obviated. With copper, acetylene forms a somewhat explosive substance called copper-acetylene. Acetylene is now common as an illuminant, especially in country mansions and other detached establishments.

ACHÆMENIDÆ, a dynasty of ancient Persian kings, being that to which the great Cyrus belonged. See PERSIA.

ACHALZICH. See AKALZIK.

ACHIMENES, a genus of tropical American plants, of the order Gesneraceæ, with scaly underground tubers, now cultivated in European greenhouses on account of their ornamental character.

ACHOR, a name sometimes given to a disease of infants, in which the head, the face, and often the neck and breast, become incrusted with thin, yellowish or greenish scabs, arising from minute, whitish pustules, which discharge a viscid fluid. It is a variety of eczema.

ACIERAGE (French term, from *acier*, steel), a process by which an engraved copper-plate, or an electrotype from an engraved plate of steel or copper, has a film of iron deposited over its surface by electricity in order to protect the engraving from wear in printing. By this means an electrotype of a fine engraving, which, if printed directly from the copper, would not yield 500 good impressions, can be made to yield 3000 or more; and when the film of iron becomes so worn as to reveal any part of the copper, it may be removed and a fresh coating deposited, so that 20,000 good impressions may be got.

ACIPENSER, the genus of cartilaginous ganoid fishes to which the sturgeon belongs. See STURGEON.

ACONQUIJA, a range of mountains in the Argentine Republic, on the western border of the province of Tucuman. The name is also given to a single peak about 16,000 feet high.

ACORN, the common name for the fruit of the different kinds of oak, collectively spoken of as *mast*. The acorn-cups of one species are brought from the Levant under the name of *valonia*, and are used in tanning. See OAK and VALONIA.

ACTINISM, the property of those rays of light which produce chemical changes, as in photography, in contradistinction to the light rays and heat rays. The actinic property or force begins among the green rays, is strongest in the violet rays, and extends a long way beyond the visible spectrum.

ACTINOLITE, a mineral nearly allied to hornblende (which see).

ACTINOMETER, an instrument for measuring the intensity of the sun's actinic rays. Sir J. Herschel invented one in 1825, and several others have

been devised since. They usually depend on the production of chemical changes in liquids. See ACTINISM above.

ACT OF GOD, a legal term defined as 'a direct, violent, sudden, and irresistible act of nature, which could not, by any reasonable cause, have been foreseen or resisted'. No one can be legally called upon to make good loss so arising.

ACT OF PARLIAMENT, a law or statute proceeding from the parliament of the United Kingdom passed in both houses, and having received the royal assent. Before it is passed it is a *bill* and not an act. Acts are either public or private, the former affecting the whole community, the latter only special persons and private concerns. The chief public bills are those introduced by the ministry in fulfilment of their party pledges, and nowadays no other public bill has much chance of getting through even one of the houses. Private bills before they can be passed into acts entail great expense on their promoters, but the procedure in the case of public bills is simpler and imposes no direct expense on those responsible for them. They have to pass in each house a preliminary first reading, after which they are printed. On the second reading the general principle is discussed, and if accepted the bill goes into committee of the whole house, when it is considered clause by clause. This is followed by a report stage, which sometimes becomes a second committee stage; and finally the bill is submitted to a third reading. The whole body of public acts constitutes the *statute law*. An act of parliament can only be altered or repealed by the authority of parliament. Acts are usually cited in this way, '13 and 14 Vict. c. (or chap.) 21', which means the 21st act in succession passed in year 13th–14th of the queen's reign (that is, 1850). Short titles, such as 'the Merchant Shipping Act, 1854', are also used. Up to the time of Edward I. acts of parliament were in Latin; then French was introduced, and for some time was exclusively employed. It was not till Henry VII. that all acts were in English. See PARLIAMENT.

ACTON, a kind of padded or quilted vest or tunic formerly worn under a coat of mail to save the body from bruises, or used by itself as a defensive garment. Jackets of leather or other material plated with mail were also so called. *Gambeson* was an equivalent term.

ACTON, a name of various places in England, one of them a western suburb of London in the Ealing division of Middlesex, with a pop. of 37,744. The name of course means *oak-town*.

ADAMS, CHARLES FRANCIS, American litterateur and statesman, was a son of John Quincy Adams, and was born in 1807. His youthful years were spent in Europe, partly in England; but he finished his education at Harvard, and afterwards studied law. After serving some years in the Massachusetts legislature he was sent to congress in 1859. In 1861 he was sent to England as American minister, and here he remained for seven years, performing the arduous duties of his office with the utmost tact and ability. He edited a complete edition of his grandfather's works (President John Adams) in ten vols., with a life. He was one of the arbitrators on the Alabama claims. He died Nov. 21, 1886.

ADAMS, JOHN COUCH, English astronomer, was born near Launceston, Cornwall, on June 5th, 1819. He was educated at Devonport and at St. John's College, Cambridge, and graduated as senior wrangler in 1843. He was shortly afterwards elected fellow of his college, and in 1853 became fellow of Pembroke College. The great work of his life was his share in the discovery of the planet Neptune. Many observations of the position of the planet Uranus had been recorded on the supposition that it was a star before Herschel determined it to be a planet. These observations were found to disagree seriously with those made after Herschel's discovery, and in Bouvard's tables of 1821 they were rejected altogether. But only eleven years later Bouvard's tables were declared by Airy, the astronomer royal, to be 'in error nearly half a minute of space'. Many, including Bouvard, ventured the explanation of a hitherto unknown disturbing planet, but it was reserved for Adams and the French astronomer Leverrier to work out the calculations completely. The results of Adams's labours were communicated in September and October, 1845, to Professor Challis and Airy. Leverrier had by this time been engaged in the same line of research, and had come to substantially the same results, which, being published in 1846, led to the actual discovery of the planet Neptune by Galle of Berlin. Adams is also known for his work on lunar acceleration and for his calculation of the period of the November meteors. In 1858 he was appointed professor of mathematics in St. Andrews University, and in the following year he became Lowndean professor of astronomy and geometry at Cambridge, a post which he held till his death on January 21, 1892.

ADAM'S BRIDGE, a chain of reefs, sand-banks, and islands 17 miles in length stretching between India and Ceylon: so called because the Mohammedans believe that when Adam was driven from paradise he had to pass by this way to Ceylon (where is also Adam's Peak). In 1838, English engineers set gangs of convicts to deepen the Pambam channel between the island of Rameswaram, at one end of Adam's Bridge, and the coast of India. The operations have been subsequently continued, and the passage has by this means been made practicable for steam-boats and even for war-ships of moderate size.

ADDAX, a species of antelope (*Hippotragus nasomaculatus*) of the size of a large ass, with much of its make. Both sexes have horns. The horns of the male are about 4 feet long, beautifully twisted into a wide-sweeping spiral of two turns and a half, with the points directed outwards. The head, the neck, and the short mane are brown, the rest of the body whitish-yellow. A white transverse stripe is always to be seen on the nose. It is a swift runner and defends itself with courage against dogs when wounded. It has tufts of hair on the forehead and throat, and large broad hoofs. It inhabits the sandy regions of Nubia, Kordofan, and the Eastern Sahara generally.

ADDER-STONE, the name given in different parts of Britain to certain rounded perforated stones or glass beads found occasionally, and supposed to have a kind of supernatural efficacy in curing the bites of adders. They are believed to have been anciently used as spindle-whorls, that is, a kind of small fly-wheels to keep up the rotatory motion of the spindle.

ADDER'S-TONGUE, a species of British fern (*Ophioglossum vulgatum*), whose spores are produced on a spike, supposed to resemble a serpent's tongue. Its stem is slender and about 8 inches in length, and the leaflike part of the frond is mucilaginous. It grows in moist pastures and in woods.

ADDER'S-WORT, a name of snakeweed or bistort (*Polygonum Bistorta*), from its supposed virtue in curing the bite of serpents. See BISTORT in SUPP.

ADDISCOMBE, a suburb of Croydon, Surrey, where the East India Company had formerly a military college, at which many cadets were trained for service in India.

ADDISON'S DISEASE (from Dr. Addison,

1793–1860, Guy's Hospital, London, who traced the disease to its source), a fatal disease, the seat of which is the two glandular bodies placed one at the front of the upper part of each kidney, and called *suprarenal capsules*. It is characterized by anæmia or bloodlessness, extreme prostration, and the brownish or olive-green colour of the skin. The person attacked becomes less and less disposed to bodily exertion, and the least effort brings on shortness of breath and palpitation. In advanced cases sudden attacks of faintness are the result of even trifling exertion. Various other symptoms accompany these —loss of appetite, sickness and vomiting, dimness of sight, headache, chilliness, &c. Death usually results from weakness, and commonly within a year. The disease has as yet been found to be incurable. All that can be done is to maintain the patient's strength by wholesome food, tonics, and perhaps stimulants.

ADDLED PARLIAMENT, a parliament called on April 5, 1614, in order to legalize the customs duties imposed by James I., but which, proceeding to the redress of grievances instead of granting supply, was dissolved, June 7, without passing a single bill.

ADELA, born 1062, was the fourth daughter of William the Conqueror, and was married in 1080 to Stephen, son and heir of Theobald, Earl of Blois and Chartres. Her husband succeeded his father in 1090, and she subsequently took an active part in the management of his dominions. In particular she acted as regent during the absence of her husband in the first crusade in 1095–99. He was slain in a second expedition to the Holy Land in 1101, and after his death, as before this event, she proved herself an able ruler and a generous patroness of learning. In 1106 she resigned the government to her second son, Theobald, as being mentally and physically the superior of his elder brother, William. The last years of her life were spent in a convent, though she still took a considerable part in worldly affairs. Her benefactions to the church were numerous and munificent. She died in 1137. Stephen, King of England, was the third son of Adela.

ADELAIDE, daughter of George, Duke of Saxe-Coburg-Meiningen, and wife of the Duke of Clarence, afterwards William IV., King of England, was born in 1792, and died in 1849. She was married 11th July, 1818, her husband being then double her age, and had two daughters, who died in infancy. She became queen-consort on William attaining the throne in 1830, and was for a time unpopular from being supposed to be averse to reform, though at her death she had long outlived this unpopularity. On the death of William she passed into private life, with an allowance of £100,000 a year, much of which she spent on charitable and other worthy objects.

ADELARD OF BATH, an English philosophical writer of the twelfth century, whose proper name was Æthelhard. He travelled through Spain, the north of Africa, Greece, and Asia Minor, and acquired much knowledge from the Arabs, which he put in systematic shape. His chief works were Perdifficiles Quæstiones Naturales, and De Eodem et Diverso (on Identity and Difference), in which is discussed the question of reconciling the real existence of the individual with that of the species or genus. He also translated Euclid's Elements, but whether from the Greek original or from an Arabic translation is uncertain.

ADENANTHERA, a genus of trees and shrubs, natives of the East Indies and Ceylon, belonging to the natural order Leguminosæ. *A. pavonina* is one of the largest and handsomest trees of India, and yields hard solid timber called red sandal-wood. The bright scarlet seeds, from their equality in weight (each = 4 grains), are used by goldsmiths in the East as weights.

ADENITIS (Gr. *adēn*, a gland), in medicine, inflammation of one or more of the lymphatic glands. It may take place in wounded parts of the surface of the body through the introduction of poisonous matter. Adenitis is often found along with angeioleucitis or inflammation of the lymphatic vessels.

ADERER. See ADRAR (in SUPP.).

ADIAPHORISTS (Gr. *adiaphoros*, indifferent), a name given in the sixteenth century to Melanchthon's party, who held some opinions and ceremonies to be indifferent which Luther condemned as sinful or heretical. Among the ceremonies regarded as indifferent were various ritualistic adornments of worship.

ADIRONDACK MOUNTAINS, in the U. States, a group belonging to the Appalachian chain, extending from the N.E. corner of the state of New York to near its centre. The scenery is wild and grand, diversified by numerous beautiful lakes, and the whole region is a favourite resort of sportsmen and tourists. Mount Marcy is the highest peak, and is nearly 5500 feet in height.

ADIS ABBABA, or ADDIS ABEBA, the present capital of Abyssinia, formerly only the capital of Shoa, a district of southern Abyssinia, whose ruler Menelek is now master of the whole country. It stands at the height of about 10,000 feet above the sea, is surrounded by mountains, and though of quite recent origin is said to have already a population of 50,000, the buildings being of very slight construction. It exports gold, ivory, coffee, wax, &c.

ADIT, a more or less horizontal opening, giving access to the shaft of a mine. It is made to slope gradually from the farthest point in the interior to the mouth, and by means of it the principal drainage is usually carried on. See MINE.

ADMIRALTY ISLAND, an island belonging to the United States off the N.W. coast of North America, 80 or 90 miles long and about 20 broad, covered with fine timber and inhabited by Sitka Indians.

ADOBE, the Spanish name for a brick made of loamy earth, containing about two-thirds fine sand and one-third clayey dust, sun-dried; in common use for building in Mexico, Texas, and Central America.

ADOLPHUS, JOHN, an able English criminal lawyer, was born August 7, 1768. His first acknowledged work was Biographical Memoirs of the French Revolution, published in 1799, and three years later appeared his History of England from the accession of George III. to the conclusion of peace in 1783. The success of this book brought him under the notice of Addington, the prime minister, and led to his taking a very active part in politics, chiefly as a pamphleteer. He was called to the bar in 1807, and soon became one of the foremost lawyers of his day. At the time of his death, on 16th July, 1845, he was engaged on an extension of his history to the death of George III.

ADONI, a town in the Bellary district of India, in Madras, distant from Bellary about 66 miles, and from Madras 307, and connected by railway with both. It is known for excellent silk and cotton fabrics and carpets. It is a place of some antiquity, and its history is not without interest. Pop. in 1891, 26,243; in 1901, 30,416.

ADONIS, a small river rising in Lebanon and flowing to the Mediterranean. When in flood it is tinged of a red colour, and so is connected with the legend of Adonis.

ADONIS, a genus of ranunculaceous plants. In the corn-adonis or pheasant's eye (*A. autumnalis*) the petals are bright scarlet like blood, and the plant is fabled to have sprung from the blood of the mythical Adonis. It is occasionally found in cornfields in some parts of Britain. Several species of the genus are cultivated for the beauty of their flowers.

ADRAR, a populous town in the French Sahara, south of the western part of Algeria, and belonging to the group of oases known by the general name of Twat. It is surrounded by a wall, and carries on a caravan trade in ivory, gold-dust, ostrich feathers, grain, oil, coffee, &c.—ADRAR or ADERER is also the name of an oasis tract in the Western Sahara, lat. 19° N., lon. 12° W., inhabited by Berbers, Tuaregs, Arabs, &c., possessing camels, sheep, and oxen, and cultivating dates, wheat, barley, cotton, melons, &c. A considerable caravan trade is carried on. The largest town is Shingeti or Shingit (pop. 30,000), which is a great depot for salt, obtained at a place five days' journey to the north-east.

ADULARIA, a very pure, limpid, translucent variety of the common felspar, called by lapidaries *moonstone*, on account of the play of light exhibited by the arrangement of its crystalline structure. It is found on the Alps, but the best specimens are brought from Ceylon. It is so called from *Adula*, one of the peaks of St. Gothard, where fine specimens are got.

ADULLAM, CAVE OF, a cave to which David fled when persecuted by Saul, and whither he was followed by 'every one who was in distress, in debt, or discontented' (1 Sam. xxii. 1, 2). The name *Adullamites* was given to an English political party, consisting of Mr. R. Lowe, Lord Elcho, and other Liberals, who opposed the majority of their party on the Franchise Bill of 1866. The term originated from a speech of Mr. John Bright.

ADYTUM, a secret place of retirement in the ancient temples, esteemed the most sacred spot; the innermost sanctuary or shrine. From this place the oracles were given, and none but the priests were permitted to enter it. The Holy of Holies or Sanctum Sanctorum of the Temple at Jerusalem was of a similar character.

ÆGAGRUS, a wild species of ibex (*Capra ægagrus*), found in troops on the Caucasus and many Asiatic mountains, and even in Crete, believed to be the original source of at least one variety of the domestic goat. The bezoar stones which are fabled to possess such healing virtues are especially found in the stomach of this animal.

ÆGILOPS, a genus of grasses, growing in the south of Europe, very closely allied to wheat (genus Triticum), and somewhat remarkable from the alleged fact that by cultivation one of the species becomes a kind of wheat. It is said that if this species (*Æ. ovata*) is cultivated for five or six years in succession it assumes more and more the character of a wheat; and some believe that it is really the origin of our cultivated wheats. On the other hand, some assert that hybridization with wheat is what gives it the wheat character.

ÆGOSPOTAMI ('goat-rivers'), a place on the Hellespont, of some note in Greek history, the Athenian fleet being here completely defeated in 405 B.C. by the Spartan Lysander, thus ending the Peloponnesian war.

ÆPYORNIS, a genus of gigantic birds whose remains have been found in Madagascar, where it is supposed to have lived perhaps not longer than 200 years ago. The æpyornis first came to the knowledge of Europeans about 1850, some empty shells of its eggs being seen in the possession of natives who used them as vessels for holding water or the like. In 1851 Isidore Geoffrey-Saint-Hilaire read a paper on the bird before the Paris Academy of Sciences, and proposed for it the name *Æpyornis maximus*. It had three toes, and is classed with the cursorial birds (ostrich, &c.). One remarkable feature is the extraordinary massiveness of the bones. Its eggs measured 14 inches in length, and were about six times the bulk of those of the ostrich. The bird which laid them may well have been the roc of Eastern tradition. Egg-shells are still from time to time found, especially in marshes.

ÆTHRIOSCOPE (Gr. *aithrios*, clear, cloudless), an instrument for measuring radiation towards a clear sky, consisting of a metallic cup with a highly-polished interior of paraboloid shape, in the focus of which is placed one bulb of a differential thermometer, the other being outside. The inside bulb at once begins to radiate heat when exposed to a clear sky, and the extent to which this takes place is shown by the scale of the thermometer. The æthrioscope also indicates the presence of invisible aqueous vapour in the atmosphere, radiation being less than when the air is dry.

ÆTHUSA, a genus of umbelliferous plants. See FOOL'S PARSLEY in SUPP.

AËTIUS, a general of the western Roman Empire, born A.D. 396; murdered 454. As commander in the reign of Valentinian III. he defended the empire against the Huns, Visigoths, Franks, Burgundians, &c., completely defeating the first in particular under Attila in a great battle at Châlons in 451. For twenty years he was at the head of public affairs, and latterly was murdered by Valentinian from jealousy of his power.

AGALLOCHUM, a fragrant wood obtained from *Aloexylon Agallochum*, a leguminous tree of Cochin-China, and from *Aquilaria Agallocha*, a large tree of the order Thymeleaceæ, inhabiting north-east Bengal, abounding in resin and an essential oil which yields a perfume used as incense.

AGALMATOLITE (Gr. *agalma*, image), a kind of stone, a clay-slate altered by heat and by the addition of alkalies, which is carved into images, &c., by the Chinese. The name, however, embraces more than one kind of mineral, and includes steatite, pinite, &c.

AGAMOGENESIS, a general name for the various modes of asexual reproduction in plants and animals. See PARTHENOGENESIS, REPRODUCTION.

AGARIC MINERAL, or MOUNTAIN-MEAL, one of the purest of the native carbonates of lime, found chiefly in the clefts of rocks and at the bottom of some lakes in a loose or semi-indurated form resembling a fungus. The name is also applied to a stone of loose consistence found in Tuscany, of which bricks may be made so light as to float in water, and of which the ancients are supposed to have made their floating bricks. It is a hydrated silicate of magnesium, mixed with lime, alumina, and a small quantity of iron.

AGNI, the Hindu god of fire, one of the eight guardians of the world, and especially the lord of the south-east quarter. He is celebrated in many of the hymns of the Rig Veda. He is often represented as of a red or flame colour, and rides on a ram or a goat. He is still worshipped as the personification of fire. The name meant originally simply 'fire', being cognate with the Latin *ignis*, fire.

AGNOSTICISM, a word whose introduction into the English language in 1869 by Professor Huxley may be explained in his own words: 'When I reached intellectual maturity, and began to ask myself whether I was an atheist, a theist or a pantheist, a materialist or an idealist, a Christian or a free-thinker, I found

that the more I learned or reflected the less ready was the answer. . . So I took thought, and invented what I conceived to be the appropriate title of 'Agnostic'. It came into my head as suggestively antithetic to the 'Gnostic' of Church history, who professed to know so much about the very things about which I was ignorant. . . To my great satisfaction the term took; and when the Spectator had stood godfather to it any suspicion in the minds of respectable people that a knowledge of its parentage might have awakened was of course completely lulled.' The Agnostic does not pretend to support or lay down a system of positive philosophy. He does not even venture to deny outright the existence of spiritual influences or entities external to man's consciousness. He takes up a position of suspended judgment; he says that there *may be* a Supreme Being; that the soul *may be* immortal; but that these things, if not unknowable, are at any rate unknown. Taking his stand on the position that the phenomena of consciousness occur in relation to a material organism, and are conditioned by physical processes, he doubts whether they can ever exist apart from the organism and without physical stimulus. He denies the possibility of interruption in the working of the laws of causation, and consequently rejects miracles and denies the freedom of the will. On the same ground he feels bound to admit an original and *possibly* eternal existence, possessed of an energy *possibly* eternal. But the God of theology is denied, and Agnosticism as a polemical force confines itself almost entirely to critical onslaughts on the veracity of Biblical history and the evidences of orthodox Christianity.

AGONIC LINE (Gr. *a*, not, and *gōnia*, an angle), in terrestrial magnetism, a name applied to the line which joins all the places on the earth's surface at which the needle of the compass points due north and south, without any declination. This line, which varies from time to time, at present passes through S. America and N. America to the Magnetic North Pole, thence to the White Sea, south through the Persian Gulf, Indian Ocean, and Australia to the Southern Magnetic Pole.

AGORA, the market-place of a Greek town, corresponding to the Roman *forum*. The agora of ancient Athens was situated in the valley partially inclosed by the Acropolis, Areopagus, Pnyx, and Museum. The agora held an important place in the city life of ancient Greece as the place where public meetings were held and public affairs discussed.

AGOULT, Marie de Flavigny, Comtesse d', a French writer of fiction, history, politics, philosophy, and art. She was the daughter of Viscount de Flavigny, and was born at Frankfort in 1805. She contributed many articles to the Revue des Deux-Mondes, &c., under the name of *Daniel Stern*, and wrote Histoire de la Révolution de 1848; Trois Journées de la Vie de Marie Stuart; Florence and Turin, a series of artistic and political studies; Dante and Goethe; dialogues, and numerous romances, &c. In 1827 she was married to the Comte d'Agoult, but later she formed a *liaison* with Liszt, the celebrated musician. One of her daughters by the latter union married first the musician Von Bulow, and afterwards Wagner. Her death took place at Paris on March 5th, 1876.

AGRICULTURAL HOLDINGS ACT, 1883, an act which came into force on January 1, 1884, conferred on outgoing agricultural tenants the right of receiving compensation from landlords in respect of improvements carried out by them during their tenancy. It does not apply to any holding 'not either wholly agricultural or wholly pastoral, or in part agricultural and as to the residue pastoral, or in whole or in part cultivated as a market garden'. The amount of compensation is by the provisions of the Act to be the sum which fairly represents the value of the improvements to an incoming tenant, and these improvements are grouped in three classes. The first group comprises all those of a more permanent character, such as erection or enlargement of buildings, laying down of permanent pasture, making of gardens, roads, bridges, ponds, and permanent fences, and reclamation of waste land. In respect of these, compensation can be claimed only if the consent of the landlord to their undertaking is proved. Drainage operations require that notice should be given to the landlord; but compensation in respect of the third class of improvements, which include boning of land with undissolved bones, claying, liming, or marling it, and manuring with purchased artificial or other manures, is not dependent on the landlord's consent in any form. The landlord may contract himself out of the provisions of the Act by making special agreements with tenants. Amending or extending acts were passed in different years between 1883 and 1906 (this last coming into force in 1909).

AGROSTIS, a genus of grasses, consisting of many species valuable as pasture-grasses. The bent grasses belong to the genus. See Fiorin in Supp.

AGUARDIENTE, a popular spirituous beverage of Spain and Portugal, a kind of coarse brandy, made from red wine, from the refuse of the grapes left in the wine-press, &c., and generally flavoured with anise. The same name is also given to a Mexican alcoholic drink distilled from the fermented juice of the agave.

AGUILAR, Grace, an English writer, was born at Hackney, near London, in 1816, and died at Frankfort on September 16, 1847. Of Jewish parentage, she at first devoted herself to Jewish subjects, some of her works of this period being The Magic Wreath, a book of verse; The Spirit of Judaism; and The Jewish Faith; but her fame rests on her novels, Home Influence, A Mother's Recompense, Home Scenes and Heart Studies, &c., most of which were published posthumously under the editorship of her mother.

AGUILAS, a flourishing seaport of southern Spain in the province of Murcia, about 37 miles to the S.W. of Cartagena, with copper and lead smelting works. It carries on considerable trade in ores, &c. Pop. (1887), 8947; (1897), 12,381.

AHAGGAR, Hoggar, or Hogar, a mountainous region of the Sahara, south of Algeria, with some fertile valleys, inhabited by the Tuaregs. It rises in terraces to a height of nearly seven thousand feet, and some of its heights are covered with snow for a number of weeks each year. Figs, vines, dates, &c., are cultivated in parts.

AHMED SHAH, founder of the Durâni dynasty in Afghanistan, was born in 1724, and died in 1773. On the assassination of Nadir Shah he proclaimed himself shah, and set about subduing the provinces surrounding his realm. Among his first acts was the securing of the famed Koh-i-noor diamond, which had fallen into the hands of his predecessor. He crossed the Indus in 1748, and his conquests in northern India culminated in the defeat of the Mahrattas at Panipat (6th January, 1761). Affairs in his own country necessitated his withdrawal from India, but he extended his empire in other directions far beyond the limits of modern Afghanistan. He was succeeded by his son Timur.

AHWAZ, a small Persian town on the river Karun, province of Khuzistan, in the immediate neighbourhood of which are the vast ruins of a city, ascribed to the time of the Parthian empire, ex-

tending for 12 miles along the river side. The rapids at Ahwaz form the chief obstacle to the navigation of the Karun. See KARUN in SUPP.

AIGUILLE (French word meaning, literally, a needle), a name given in the Alps to the needle-like points or tops of granite, gneiss, quartz, and other crystalline rocks and mountain masses; also applied to sharp-pointed masses of ice on glaciers and elsewhere.—MONT AIGUILLE or MONT-INACCESSIBLE is the name given to a French mountain in dep. Isère, 6500 feet high, with a peculiar flat summit surrounded by steep rocky sides, and at one time believed to be inaccessible. By means of wire, ropes and other appliances its ascent is now rendered comparatively easy.

AIGUN, a town of China, in Manchuria, on the Amur, not far from the Russian town of Blagovyeshchensk. It has a good trade. Pop. 15,000.

AIMARD, GUSTAVE, French novelist; born September 13, 1818; died June 20, 1883. At the age of twenty he shipped as a cabin-boy, and spent the next ten years in travel and adventure in Northern and Central America. Returning to France in 1848, he served as an officer in the Garde Mobile, but soon set out again on his travels. From his wide personal experience of many peoples and lands, especially of the North American Indians, he derived the subjects of most of his novels. Some of these are: Les Trappeurs de l'Arkansas (1858); Les Francs-Tireurs (1861); Une Vendetta Mexicaine (1866); and Par Mer et par Terre (1879). He rendered brilliant services in the war of 1870 as organizer of the Francs-tireurs de la Presse, but his literary success then began to wane; and, losing his reason, he was confined in an asylum, where he died at the age of sixty-five.

AINSWORTH, WILLIAM FRANCIS, Ph.D., was born at Exeter in 1807. He was educated in London, Paris, Brussels, and Edinburgh, and in 1827 qualified as L.R.C.S. On returning from a tour in France, during which he prosecuted geological investigations in the Auvergne and Pyrenees mountains, he became co-editor of the Edinburgh Journal of Natural and Geographical Science. In 1832 he went to Sunderland in order to study the cholera epidemic which had broken out, and during that and the following year he served as surgeon in various cholera hospitals. In 1835 he joined Colonel Chesney's Euphrates expedition as surgeon and geologist, and shortly after his return in 1837 he published Researches in Assyria, Babylonia, and Chaldæa. During the next eight years he carried out further investigations in Asia Minor and Kurdistan on behalf of the Royal Geographical Society and the Society for Promoting Christian Knowledge; and of these he published several records. His Travels in Asia Minor, Mesopotamia, and Armenia appeared in 1842, and two years later he published a description of the route of the Greeks under Xenophon after the battle of Cunaxa under the title, Travels in the Track of the Ten Thousand. In 1888 his Personal Narrative of the Euphrates Expedition appeared. Other works of his are the Euphrates Valley Route to India, and Claims of the Oriental Christians. He was associated with many learned societies both in Britain and on the Continent. The founding of the West London Hospital was largely due to him. He died on November 27, 1896.

AINSWORTH, WILLIAM HARRISON, a popular novelist, was born in Manchester on the 4th February, 1805. His father, a successful solicitor, intended him for the same profession, and after giving him a sound education at the grammar-school of his native town, had him articled in his sixteenth year to a leading solicitor there. On his father's death, three years later, he went to London to finish his legal education. His bent was, however, towards literature, and the striking success of his first important novel, Rookwood (pub. 1834), decided his profession. His following story, Crichton (1837), was equally successful; but the popularity of both was greatly exceeded by that of Jack Sheppard (1839), of which eight different dramatic versions were soon produced on the stage. About forty other novels, dealing mainly with the history and traditions of England, several indeed with those of his native county, Lancaster, appeared in rapid succession. We can only mention a few of the more important: The Tower of London (1840); Guy Fawkes (1841); Old St. Paul's (1841); Windsor Castle (1843); St. James's, or the Court of Queen Anne (1844); The Lancashire Witches (1848); The Star Chamber (1854); The Flitch of Bacon (1854); Mervyn Clitheroe, a semi-autobiographical tale (1857); Cardinal Pole, or the Days of Philip and Mary (1863); The Spanish Match, or Charles Stuart in Madrid (1865); The Constable de Bourbon (1866); Boscobel (1872); The Good Old Times (1873); Merry England, or Nobles and Serfs (1874); Stanley Brereton (1881); &c. From 1842 to 1853 he published Ainsworth's Magazine, and for a number of years he edited the New Monthly Magazine. He died at Reigate in Surrey on the 2nd January, 1882.

AIRD, THOMAS, poet, was born at Bowden, Roxburghshire, 28th August, 1802; and died at Dumfries, 26th April, 1876. His parents were in humble circumstances, but were ambitious to see their son in a pulpit. He was sent to the parish school, and by and by to the Edinburgh University, where he eked out his slender allowance by teaching. But the literary spirit was in him, and about 1826 his offerings to Blackwood's Magazine attracted the attention of Professor Wilson. In 1827 he saw his first book, entitled Religious Characteristics, issued by Blackwood, with an introduction by Professor Wilson; and the idea of entering the clerical profession was abandoned. In 1835 Aird was appointed editor of the newly established Tory paper, the Dumfries and Galloway Herald. He removed to Dumfries, and there passed the remainder of his life, being editor of the Herald for twenty-eight years. By his own request he was buried in St. Michael's Churchyard, Dumfries, where lie the remains of Robert Burns. His poetical works were first published in a collected form in 1848, and have passed through several editions. The Devil's Dream on Mount Aksbeck is his best-known poem, and in it there is a weird phantasy which is characteristic of much of his work. His principal prose tales are contained in the volume entitled The Old Bachelor in the Old Scottish Village, in which there are many personal experiences narrated; and it was his own bachelorhood which suggested the title.

AIR-ENGINE, an engine in which air heated, and so expanded, or compressed air, is used as the motive power. A great many engines of the former kind have been invented, some of which have been found to work pretty well where no great power is required. They may be said to be essentially similar in construction to the steam-engine, though of course the expansibility of air by heat is small compared with the expansion that takes place when water is converted into steam. Engines working by compressed air have been found very useful in mining, tunnelling, &c., and the compressed air may be conveyed to its destination by means of pipes. In such cases the waste air serves for ventilation and for reducing the oppressive heat. Among patents for air-engines of various kinds we may mention those of Glazebrook, Stirling, Ericsson and Schwarz.

AIRY, SIR GEORGE BIDDELL, English astronomer-

royal, was born at Alnwick 27th July, 1801. After an education at various schools, including latterly Manchester grammar-school, he entered Trinity College, Cambridge, in 1819, where he graduated as senior wrangler in 1823, and next year was elected to a fellowship. In 1826 he was appointed Lucasian professor of mathematics at Cambridge, a chair once held by Newton, and he was the first actual director of the Cambridge observatory, founded in 1828, holding in connection with this post the Plumian professorship of astronomy. In 1835 he succeeded Pond as director of the Greenwich observatory, entering upon his new duties on Jan. 1, 1836, and he retained this office until 1881, when he retired on a pension of £1100 a year. He belonged to many learned societies, and many honours accrued to him, among them a knighthood (K.C.B.) in 1872. He died at Greenwich on Jan. 2, 1892. His work was very varied in character. The study of optics first attracted him; he was skilled in meteorology and magnetism; but astronomy was his chief pursuit. He initiated at Greenwich the plan of immediately and completely reducing observations; he introduced the regular observation of magnetic phenomena, and of sun-spots by photography; he invented new instruments for lunar observations, and arranged the British observations in all parts of the world of the transit of Venus in 1874. His chief works were Mathematical Tracts (1826); Ipswich Lectures on Astronomy (1849; in later editions called Popular Astronomy); Undulatory Theory of Optics (1866); Treatise on Sound (1869); and Treatise on Magnetism (1870); besides which he wrote numerous articles on historical as well as scientific subjects.

AITUTAKI, one of the Cook's or Hervey Islands in the Pacific Ocean. It is 18 miles in circumference, and has about 2000 inhabitants.

AJANTA, a village and ravine of India, in the Nizam's Dominions, 24 miles north of Assaye. The ravine, 4 miles N.W. of the village, is celebrated for its cave temples, twenty-nine in number, excavated out of a wall of almost perpendicular rock about 250 feet high. They are all richly ornamented with sculpture, and covered with highly-finished paintings.

AJOWAN (*Ptychotis Ajowan*), an umbelliferous plant cultivated in India, Persia, and Egypt, the seeds of which are used in cookery and in medicine, having carminative properties. Other seeds are known in eastern commerce under the same name.

AKAROID GUM. See ACAROID RESIN in SUPP.

AKASSA, a port of entry in Nigeria, situated at the mouth of the Nun, the only permanently navigable branch of the Niger. It is a place of some trade, chiefly in gums, ivory, palm-oil, &c., and is one of the principal settlements in the British possession of Southern Nigeria.

AKKADIANS. See ACCADIANS in SUPP.

AKKAS, a dwarfish race of Central Africa, dwelling in scattered settlements to the north-west of Lake Albert Nyanza, about lat. 3° N., lon. 29° E. Their height averages about 4½ feet, and they are of a brownish or coffee colour. Their heads are large, jaws projecting (or prognathous), ears large, hands small. They are timid and suspicious, and live almost entirely by the chase, being exceedingly skilful with the bow and arrow.

ALACTAGA (*Alactaga jaculus*), a rodent mammal, closely allied to the jerboa, but somewhat larger in size, with a still longer tail. Its range extends from the Crimea and the steppes of the Don across Central Asia to the Chinese frontier. It is also known as the jumping-rabbit.

ALAMOS, a town of Mexico, in the south of the state of Sonora, fully 50 miles north of the south-western point. It is well built, and is the capital of a mining district. Pop. 12,000.

ALARM, in military language, a signal, given by beat of drum, bugle-call, or firing of a gun, to apprise a camp or garrison of a surprise intended or actually made by the enemy. A place, called the *alarm-post*, is generally appointed at which the troops are to assemble when an alarm is given.—*Alarm* is also the name given to several contrivances in which electricity is made use of, as a *fire-alarm*, by which intelligence is at once conveyed to the proper quarter when a fire breaks out; a *burglar-alarm*, an arrangement of wires and a battery in a house intended to set a bell or bells ringing should a burglar attempt to gain entrance.—An *alarm-clock* is one which can be set so as to ring loudly at a certain hour to wake from sleep or excite attention.

ALASSIO, a seaport of North Italy, on the Gulf of Genoa, some 25 miles N.E. of San Remo, with which and with many other places on the coast of the gulf it is connected by rail. It is a winter resort of people from England. A number of the inhabitants are engaged in fishing. Pop. 5000.

ALATAU, the name of three considerable mountain ranges of Central Asia, on the Russian and Chinese frontiers. The Zungarian Alatau lies north of the Ili river, and serves as a boundary between Russian and Chinese territory. South of the Ili and north of Lake Issik-Kul is the Kungei-Alatau, while south of the lake, between it and the Narin river, extends the Terskei-Alatau. Other ranges of the system are the Trans-Ili, between the Kungei and the Ili river, and the Alexander range, extending west from the lake.

ALBA, a town of North Italy, prov. of Cuneo, on the Tanaro. It is the see of a bishop, and carries on a trade in wine and other country produce. Pop. (1901), 13,900.

ALBAN, ST., the traditionary proto-martyr of Britain, who flourished in the third century, was, it is said, converted from Paganism by a confessor whom he had saved from his persecutors, and, refusing to sacrifice to the gods, was executed outside of the city of Verulamium (St. Albans) in 285 or 305.

ALBANY, a seaport of Western Australia, on the south coast of the colony, on King George's Sound, with one of the finest natural harbours in Australia. It is connected with the capital, Perth, both by road and railway, the distances being 254 and 352 miles respectively. The town is well laid out, and has some excellent buildings, including churches, schools, hotels, &c. It is a port of call for steamers of the P. and O. Company, the Orient Company, and other lines. Pop. (1901), 3650.

ALBERTA, a province of Canada, formed in 1905 out of the territory of Alberta and the part of the territory of Athabasca lying west of the meridian 110°; bounded north by Mackenzie, east by Saskatchewan, south by Montana (U.S.A.), and west by British Columbia and the Rocky Mountains; area 253,540 sq. miles. The province contains numerous rivers, such as the Peace, Athabasca, and North and South Saskatchewan. Of the lakes the largest are the Lesser Slave Lake and Lake Athabasca (partly in this province). Coal is chiefly mined in the south at Lethbridge, and farther north in the Banff district. Notable features of the excellent climate are the comparatively short winter, and the warm, dry, 'Chinook winds', which blow from the west over the Rockies and rapidly melt the snow. The northern part of the province, whose capital is Edmonton on the North Saskatchewan, is adapted for agriculture, and there are valuable forests in the north-west. The southern portion, with Calgary, on the Bow River, as chief town, is a perfect ranching

country. 'Sunny Alberta' is now attracting many immigrants, and wheat-growing is making rapid advances. There are districts, however, especially in the south, where irrigation is necessary, and this is now being extended to large areas. The province is crossed in the south by the Canadian Pacific Railway, by way of Medicine Hat, Calgary, and Banff. An important branch runs northward from Calgary to Edmonton, &c., and one southward to Macleod, from which there is connection with the United States railways. A branch runs west by the Crow's Nest Pass into British Columbia. Edmonton being served also by the Canadian Northern and the Grand Trunk Pacific is bound to become a great centre of trade and population. The grand scenery of the Banff district is now included in a National Park. Pop. in 1910, 321,862.

ALBERT EDWARD, one of the great equatorial lakes of Africa, on the frontiers of the Belgian Congo territory and the Uganda protectorate of Britain, south of Lake Albert. It lies just south of the equator; but a north-eastern projection (Dweru or Lake George) extends to 6′ north latitude. Its area is about 800 square miles, but there is evidence that it is diminishing in size. The vicinity shows many signs of volcanic activity. The Semliki carries its waters to the Albert Nyanza. The lake was discovered by Stanley in 1876, explored in part by him in 1889, and by others subsequently.

ALBUMINURIA, a condition in which the urine contains albumen, evidencing a diseased state of the kidneys. It is a name for one of the forms of Bright's disease.

ALBUÑOL, a town of southern Spain, in the province of Granada, near the Mediterranean, on which it has a harbour, some 35 miles to the south of the city of Granada. Pop. (1897), 7451.

ALBURY, a rising town of Goulburn county, New South Wales, on the borders of Victoria, on the right bank of the Murray, 190 miles north-east of Melbourne, in a good agricultural and wine-producing district. The railway from Melbourne to Wodonga on the opposite bank was in 1883 brought into connection with that from Albury to Sydney by a railway bridge across the Murray. Pop. (1901), 5820.

ALCIRA, a well-built and strongly-fortified town of Spain, in the province of Valencia, on an island encircled by two arms of the river Jucar, some 25 miles from Valencia. It was founded by the Carthaginians. Pop. (1897), 19,566.

ALCOHOLISM, the name used to describe the morbid condition of the body, and especially of the nervous system, brought on by the immoderate use of alcoholic liquors. The effects of alcohol on the body are of two kinds, namely, those caused by a single act of intoxication, and those due to the long-continued habit of drunkenness. In the former case, if the alcohol is swallowed rapidly in large quantities or in a concentrated condition, it acts as a narcotic poison. The face becomes swollen and livid, or sometimes ghastly pale, and the drinker falls into a profound, though unnatural, slumber from which he cannot be roused. His skin becomes chilly and damp, and his eyes roll upwards; and convulsions, more or less violent, frequently ensue. If the state of drunkenness has been induced more gradually, the symptoms are of a similar, though less sudden and violent, character. The initial feeling of light-hearted gaiety and buoyancy slowly gives way to vivacious mirth and exuberant loquacity, which, in their turn, are succeeded by indistinctness of vision, confusion of ideas, loss of memory and the power to control the movements of the limbs. A deep sleep commonly follows, from which the drunkard wakens some hours afterwards with pains in his head and a feeling of general depression. This feeling he may seek to drive away by further indulgence in spirituous liquors, and so in time he may become a victim of chronic alcoholism. The habitual drunkard has bloated and flabby cheeks, and a complexion more or less purplish. His will is feeble, his memory is impaired, and his general health irretrievably damaged. The appetite fails, and the body becomes weak and liable to tremors. The continued use of alcoholic liquors in excess impoverishes the blood and produces fatty degeneration in various organs. The liver, which at first enlarges from congestion, afterwards shrinks ('drunkard's liver'), and the derangement of the organs of digestion produces flatulence, vomiting, and often diarrhœa. Faintness, palpitation, and an extreme liability to inflammation also ensue as consequences of the changes in the heart and blood-vessels, and the lungs become afflicted with chronic congestion. One of the well-known effects of continued over-indulgence is delirium tremens (which see). Alcoholic insanity may also result.

ALCOTT, Louisa May, a distinguished American authoress, was born in Germantown, now a part of Philadelphia, on Nov. 29, 1832. Thoreau was her teacher for a time, but her education was conducted mainly by her father. In 1862 she served in the military hospitals of Washington as a volunteer nurse, and in the following year her letters to her mother and sisters on hospital life were published. These attracted considerable attention, but her first great success as a writer was Little Women, issued in 1868. Among subsequent works are An Old-Fashioned Girl (1869); Little Men (1871); Rose in Bloom (1876); Jack and Gill (1880); and others. She died at Boston on March 6, 1888, two days after her father, who is also known as an author. Her stories are very popular with young persons.

ALDABRA, an island situated to the north of the Mozambique Channel, a small coral atoll noted for its large turtles. It is a dependency of Seychelles.

ALDOBRANDINI, the name of a Florentine family, latterly of princely rank (now extinct), which produced one pope (Clement VIII.), and several cardinals, archbishops, bishops, and men of learning. What is known as the Aldobrandini Marriage is an ancient fresco painting, now in the Vatican, belonging probably to the time of Augustus, discovered in 1606, and acquired by Cardinal Aldobrandini, nephew of Clement VIII. It represents a marriage scene in which ten persons are portrayed, and is considered one of the most precious relics of ancient art.

ALDRICH, Thomas Bailey, American poet and journalist, was born at Portsmouth, New Hampshire, on Nov. 11, 1836. The death of his father caused him to give up his intention of entering college, and he became a clerk to his uncle, a New York merchant. During his three years at the desk he contributed in prose and verse to various periodicals, and met with such success that in 1855 he was encouraged to publish a volume of his verses, the title being The Bells. His Ballad of Babie Bell, produced in the following year, had a flattering reception, and this induced him to devote his energies to literary work. His contributions to magazines and newspapers became more numerous, the Boston weekly, Every Saturday, was edited by him during the four years of its existence (1870–4); and in March, 1881, he undertook the editorship of the Atlantic Monthly, a post which his increasing success as a poet and story-writer made him resign in 1892. Among the volumes of poems published by him are Pampinea and other Poems (1861); Cloth of Gold and other Poems (1874); Flower and Thorn (1876); Lyrics and Sonnets (1880); Poems (1882); Later Lyrics (1884);

Wyndham Towers (1889); The Sister's Tragedy, with other Poems (1891); Lyrics (1895). His prose writings consist mostly of short stories or humorous narratives, among them being The Story of a Bad Boy (1870); Marjorie Daw and other People (1873); Prudence Palfrey (1874); The Queen of Sheba (1877); The Stillwater Tragedy (1880); From Ponkapog to Pesth (1883); and Ponkapog Papers (1903). He died on 19th March, 1907.

ALETSCH GLACIER, the greatest glacier in Switzerland, in canton Valais, on the north side of the Rhone valley, a prolongation of the immense mass of glaciers connected with the Jungfrau, the Aletschhorn (14,000 ft.), and other peaks. It is about 15 miles long.

ALEUROMETER (Gr. *aleuron*, flour), an instrument for indicating the bread-making qualities of wheaten flour. The indications depend upon the expansion of the gluten contained in a given quantity of flour when freed of its starch by pulverization and repeated washings with water.

ALEWIFE (corruption of the American Indian name), the *Alosa tyrannus*, a North American fish of the same genus as the shad, growing to the length of 12 inches, and taken in great quantities in the mouths of the rivers of New England, New Brunswick, and Nova Scotia, being salted and exported. See SHAD.

ALEXANDERS (*Smyrnium olusatrum*), an umbelliferous biennial plant, formerly cultivated for its leaf-stalks, which, having a pleasant aromatic flavour, were blanched and used instead of celery—a vegetable that has taken its place. It is found wild in some parts of Britain, especially near the sea-coast or beside old buildings.

ALFA, a plant closely akin to esparto (which see).

ALFALFA, a common name in the Western States of N. America for a variety of the fodder plant lucerne (which see), derived from the Spanish.

ALGIN, or ALGINE, a viscous, gummy substance obtained from certain sea-weeds, more especially those of the genus Laminaria. It can be utilized for all purposes where starch or gum is now required; may be used in cookery for soups and jellies; and in an insoluble form it can be cut, turned, and polished, like horn or vulcanite. Commercial algin or sodium alginate is not unlike gelatine, and it also resembles albumen in some ways, but from the latter it is distinguished by its not coagulating on heating. It precipitates most metals as alginates, and is insoluble in dilute acids. Analysis shows it to be composed of water, organic matter of various kinds, sodium carbonate, some neutral salts, and ash.

ALGOMA, a district of Canada, in the province of Ontario, extending northwards from Lakes Huron and Superior to the Albany River and Hudson Bay. It is rich in timber, silver, copper, iron, &c. Amongst its chief centres of population are Algoma, Chapleau, and White River. In the south it is crossed by the Canadian Pacific Railway, and by a line to Sault St. Marie.

ALICE MAUD MARY, PRINCESS, Duchess of Saxony, and Grand-duchess of Hesse, second daughter of Queen Victoria, was born in 1843, and died in 1878. In 1862 she married Frederick William Louis of Hesse, nephew of the grand-duke, whom he succeeded in 1877. She showed exemplary devotion to her father Prince Albert during his fatal illness, and to the Prince of Wales during his attack of fever in 1871. During the Franco-German war she did noble nursing service to both French and Germans. She died from diphtheria caught while nursing her husband and children. In 1884 a selection of her letters was published under the editorship of Princess Christian, containing an account of her life by Dr. Sell. These give a pleasant insight into her many accomplishments and her lofty character.

ALISON, GENERAL SIR ARCHIBALD, Bart., K.C.B., son of Sir Archibald Alison, author of The History of Europe, was born at Edinburgh, January 21, 1826. On concluding his education at the Universities of Glasgow and Edinburgh he in 1846 entered the army as ensign in the 72nd Highlanders. Seven years later he became a captain, and from that time his promotion was rapid. Brevet-major in 1856, and lieutenant-colonel in 1858, he had by 1867, the year of his succession to the baronetcy, become a colonel, and had seen considerable service at the siege of Sebastopol and whilst acting as military secretary to Lord Clyde during the Indian Mutiny. During the Ashantee war of 1873–74 he was brigadier-general and second in command. During the next three years he served as deputy adjutant-general in Ireland. On the conclusion of his tenure of office there, he was, in October, 1877, raised to the rank of major-general; and in January, 1878, he became commandant of the staff college. Five months later he undertook the duties of chief of the intelligence department at the War Office. In the Egyptian expedition of 1882 he commanded the first brigade, second division, and a few days after the bombardment of Alexandria a small body of troops under him was landed. With this force, insufficient for actual fighting, he secured a position covering the town, and occupied the railway connecting it with the suburb of Ramleh. He led the Highland brigade at the battle of Tel-el-Kebir, and after Arabi's surrender he was left in command of the army of occupation. For his distinguished services during the Egyptian campaign he received the thanks of Parliament, and he was also promoted to be lieutenant-general. Returning home in May, 1883, he was during the next few years the recipient of various military distinctions. From 1883 till 1888, with the exception of a few months in 1885, he held the command at Aldershot; during those few months he discharged the functions of adjutant-general of the forces. In 1889 he was promoted to the rank of general, but in 1893 he retired. He was appointed colonel of the Seaforth Highlanders in 1897. He died on February 5th, 1907. His work, On Army Organization, appeared in 1869.

ALKARSIN, an extremely poisonous liquid containing kakodyle, together with oxidation products of this substance, and formerly known as *Cadet's fuming liquor*, characterized by its insupportable smell and high degree of spontaneous combustibility when exposed to air. On account of the latter characteristic of the substance it has been proposed to use it in war.

ALLEN, CHARLES GRANT BLAIRFINDIE, English novelist and man of letters, was born at Kingston, Canada, on February 24, 1848. He received his earlier education in America, but afterwards studied in France and Britain, graduating as B.A. at Merton College, Oxford, in 1870, with honours in classics. From 1873 till 1877 he was professor of logic in, and principal of Queen's College, Jamaica, but afterwards he resided mainly in England, where he became well known as an exponent of evolutionary science and as a novelist. He died on October 25th, 1899. His first important work, Physiological Æsthetics, appeared in 1877; and his subsequent scientific and semi-scientific works include The Colour Sense, its Origin and Development, an essay in Comparative Psychology (1879); The Evolutionist at Large (1881); Colin Clout's Calendar (1881), the record of a summer; Vignettes from Nature (1882), popular essays on natural history; The Colours of Flowers, with special reference to the British Flora

(1882); Flowers and their Pedigrees (1884), popular papers on various common plants; and Force and Energy: a Theory of Dynamics (1888). He began his career as a novelist with Strange Stories, published in 1883; of his other works in this field we may mention Philistia (1884); Babylon (1885); For Maimie's Sake (1886); In All Shades (1887); The Devil's Die (1888); This Mortal Coil (1888); White Man's Foot (1888); The Tents of Shem (1889); Dumaresq's Daughter (1891); What's Bred in the Bone (1891); The Woman who Did (1895); The British Barbarians (1895); and An African Millionaire (1897). Besides the above, Mr. Allen has also published Anglo-Saxon Britain (1881); Charles Darwin (1885); Post-Prandial Philosophy (1894), papers reprinted from the Westminster Gazette; The Evolution of the Idea of God (1897), an inquiry into the origin and growth of religions; &c.

ALLEN, Ethan, an American revolutionary partisan and general, was born at Litchfield, Connecticut, in 1737, and died at Burlington, Vermont, in 1789. He surprised and captured Ticonderoga Fort (1775); and later he attacked Montreal, and was captured and sent to England, being exchanged in 1778. He expounded his deistical views in a work published in 1784 under the title, Reason the only Oracle of Man.—His younger brother, Ira, was also prominent in the revolutionary era.

ALLEN, John, a Scotch political and historical writer, was born near Edinburgh in 1771, and died in 1843. He studied medicine, and became M.D. of Edinburgh University. In 1801 he went abroad with Lord Holland and family, and henceforth he maintained this connection, being long an inmate of Holland House (London) and a member of the brilliant society that assembled there. He contributed many articles to the Edinburgh Review; wrote an Inquiry into the Rise and Growth of the Royal Prerogative in England; Vindication of the Ancient Independence of Scotland; &c. In 1811 he was appointed warden of Dulwich College, and from 1820 till his death he was its master or head—this office being according to the statutes confined to persons named Allen or Alleyne.

ALLEN, Ralph, celebrated as a philanthropist, and as the friend of Pope, Fielding, and the elder Pitt, was born in 1694, and died in 1764. He lived mostly at Bath, where he made a large income as farmer of a system of posts and as owner of quarries. He is the prototype of Squire Allworthy in Fielding's Tom Jones; and after the novelist's death he took charge of his family. Pope, who received many kindnesses at his hands, referred to him in the lines:

> Let humble Allen, with an awkward shame,
> Do good by stealth, and blush to find it fame.

With Pitt he was on intimate terms, and left him £1000 by will. Hurd, Sherlock, and Warburton were also his friends.

ALL-FOURS, a game at cards, which derives its name from the four chances of which it consists, for each of which a point is scored. These chances are *high*, or the ace of trumps, or next best trump out; *low*, or the deuce of trumps, or next lowest trump out; *jack*, or the knave of trumps; *game*, the majority of pips collected from the tricks taken by the respective players. The player who has all these is said to have *all-fours*. It is played by two or four persons with the full pack. The ace counts four, the king three, queen two, knave one, ten ten.

ALLIARIA, a genus of plants of the order Cruciferæ, containing but one British species, *A. officinalis*, commonly called jack-by-the-hedge, garlic-mustard, or sauce-alone. It is widely spread in Europe, and often used as a pot-herb. It is also known as *Sisymbrium Alliaria*. See Alliaceous Plants.

ALLIBONE, Samuel Austin, LL.D., American author, was born at Philadelphia on April 17th, 1816, and died at Lucerne on September 2nd, 1889. He was engaged in commercial pursuits from an early age, but always took an interest in English literature and bibliography. He acted as editor and corresponding secretary of the American Sunday School Union (Philadelphia) for some years, and in 1879 he became librarian of the Lenox Library, New York. He compiled a comprehensive and most useful Critical Dictionary of English Literature and British and American Authors (three vols., 1859, 1870, 1871; two vols. of supplement by J. F. Kirk, 1891). He also published several other works of a somewhat similar kind, one of them entitled Great Authors of All Ages, consisting of a series of prose selections from eminent writers (1880). Several of his books deal with biblical and religious subjects, such as Alphabetical Index to the New Testament, and The Union Bible Companion.

ALLINGHAM, William, poet, was born on Mar. 19th, 1824, at Ballyshannon in county Donegal, where, as afterwards in England, he held a post in connection with the customs. From an early age he contributed verses to English periodicals, and his first volume of collected pieces appeared in 1850. His Day and Night Songs appeared in 1854; and in 1864 was issued a semi-epical poem, Laurence Bloomfield in Ireland, dealing with a young landlord's efforts to improve the condition of his tenants. In the same year Allingham received a pension of £60 per annum on the civil list, and ten years later he succeeded Mr. Froude as editor of Fraser's Magazine, and married Miss Helen Paterson, the well-known water-colour painter. He died on Nov. 18th, 1889, at Hampstead. He was most successful as a writer of short lyrical pieces, but his Rambles of Patricius Walker is a delightful work in prose. In 1890 a collective edition of his works was published in 6 vols.

ALLOTMENTS, small portions of land which are let to agricultural or other labourers to be cultivated by themselves or their families during the time they may be able to spare from other occupations. This system of improving the condition of the workers in country districts was forced upon British landlords by the enormous rise in the poor-law rates, so that in 1819, and again in 1831, acts were passed to facilitate the increase of allotments. Clauses were also inserted in the Inclosure Acts providing that small portions of lands suitable for gardens should be set aside out of the common lands for the poor, but it was found by a government commission in 1868, that of 7,000,000 acres inclosed only about 2000 had been thus reserved for the labourers. In recent years, however, the need to improve the condition of the agricultural labourer has become imperative, and various acts have been passed to enable him to acquire small plots of land for cultivation. Among these is The Allotment Extension Act (1882), by which parish authorities are empowered to let out small quantities of parish land in allotments to cottagers, labourers, and others living in the parishes where the lands are situated. These powers are considerably extended in the Allotments Act (1887), which requires sanitary authorities to acquire land for allotments for the workers of their district if, upon inquiry, they find that there is a demand for such allotments, and that the land cannot be acquired by voluntary arrangement. The land to be thus let in small portions may be obtained compulsorily, if necessary, by the sanitary authority; each holding

must not exceed an acre; and the rents charged to the cultivators are to be fixed at a rate which shall merely ensure the sanitary authority against loss. The rights of the cultivator are conserved under The Allotments and Cottage Gardens Compensation for Crop Act (1887). By this act he is enabled, at the end of his tenancy, to claim compensation for all existing crops, including fruit; for labour and manure put upon the soil in view of future crops; and for all improvements in fencing, draining, building, &c., according to their value at the time of his leaving. The act provides that all disputed claims shall be settled by an arbitrator. A further addition was made to the legislation on this question by the Small Holdings Act (1892). In this measure the County Council are empowered (but not compelled) to borrow money from the Public Works Loan Commissioners, at a rate of interest not exceeding 3½ per cent, in order to acquire land for the purpose of providing small holdings to be purchased by persons who reside in the county in which the land is situated, and who are themselves able to cultivate the holdings. The amount to be thus borrowed shall not be larger than a sum which would involve a charge upon the rates for one year of a penny in the pound. The act defines a small holding as a piece of land suitable for agriculture which is not less than one acre and not more than fifty acres in extent. For the purpose of putting this act into force, it is provided that every county council shall appoint a committee for that purpose, and this committee shall acquire the necessary land if the council finds that there is a reasonable demand by the electors for small holdings, such demand to be expressed by petition. When the land is purchased, it is then to be offered for sale by the council under such conditions as—(1) The purchase is to be completed within one month of the sale; (2) one-fifth of the purchase-money is to be paid down at once in cash; another part of the purchase-money to form a perpetual rent-charge redeemable at will; and the remainder to be paid by instalments over a period of fifty years. To meet the case of labourers who have no money to effect a purchase, it is provided that the council shall let small holdings of not more than 15 acres in extent. All these holdings, whether purchased or let, are only to be obtained under the following conditions: (1) They must be cultivated by the owners; (2) they must not be sublet or subdivided without the consent of the County Council; (3) any dwelling-house erected on a holding must comply with the sanitary regulations of the County Council; (4) and not more than one dwelling-house shall be erected on a holding, and no dwelling-house shall be erected at all, where the annual value is not exceeding £25, unless the council decides otherwise. The act also empowers the council to provide buildings as part of the agreement by which a holding is let or purchased. A special allotment act for Scotland was passed in 1892, the provisions being similar to those of the English act of 1887, and the size of each holding being limited to an acre or less. The Local Government Acts of 1894 transferred the administration of the Allotment Acts to the parish councils and urban district councils created under them. A parish council may lease land for allotments, or not more than 20 acres for common pasture, and if suitable land cannot be leased by agreement on reasonable terms, the County Council may authorize them to lease compulsorily land in or near the parish for allotments, for not less than 10 and not more than 35 years. The County Council order must be confirmed by the Local Government Board, and if the former body refuse to authorize the parish council, the Local Government Board may itself do so. By the Small Holdings and Allotments Act of 1907 the size of allotments was increased to five acres as a maximum. If a county council does not take action the Board of Agriculture (instead of the Local Government Board) may now do so.

ALMA-TADEMA, Sir Lawrence (Laurenz), R.A., a native of Dronryp in the Netherlands, was born on Jan. 8, 1836. At first trained for a medical career, he began his artistic education at the Royal Academy of Antwerp in 1852, and continued it under Baron Henry Leys. A few years later he came to England, and in 1873 became a naturalized British subject. He has gained many medals and other distinctions, and bears a large number of continental decorations. He became a Royal Academician in 1879 after an associateship of three and a half years. Some of his chief paintings are: A Roman Dance (1866); Entrance to a Roman Theatre (1866); Tarquinius Superbus (1867); Flowers (1868); A Roman Amateur (1870); The Greek Pottery (1871); The Mummy (1872); Fishing (1873); A Sculpture Gallery (1874); A Picture Gallery (1874); Autumn (1874); After the Dance (1876); The Seasons (1877—4 pictures); Fredegonda (1880); Sappho (1881); The Way to the Temple (1883—his diploma work); At the Shrine of Venus (1889); and At the Close of a Joyful Day (1894). In 1883 a special exhibition of his paintings took place at the Grosvenor Gallery. He has married twice, his second wife, Miss Laura Epps, being an accomplished artist. One of his daughters has gained success in literature, and another is known as a water-colour painter. As an artist Sir L. Alma-Tadema is characterized by careful composition, brilliant colouring, and extraordinary skill in depicting textures of various kinds. Many of his pictures reveal great study and knowledge of classical archæology. He was knighted in 1899.

ALMONDBURY, a town of England, in the West Riding of Yorkshire, on the river Calder, 2 miles S.E. of Huddersfield. It possesses a fine parish church, a grammar-school founded by James I., and a number of other public buildings. The staple manufactures are fine cloths, together with cotton and silk goods. The town, which is a very old one, forms part of the parliamentary and municipal borough of Huddersfield. It is supposed by some to be the Roman Campodunum. Pop. (1901), 14,436.

ALPINE CLUB, an association of English gentlemen, originating in 1857–58, having as their common bond of union a delight in making the ascent of mountains, in the Alps or elsewhere, difficult to ascend, and in investigating everything connected with mountains. Many notable ascents, such as those of the Shreckhorn (1861), the Matterhorn (1865), and Cotopaxi (1880), have been made by members of the club; and since its formation the deaths from accidents to mountaineers have fallen to between three and four per annum. Similar associations now exist in Germany, Austria, Switzerland, and France, and in 1873 one was formed in New York.

ALSATIA, formerly a cant name for Whitefriars, a district in London, between the Thames and Fleet Street, and adjoining the Temple, which, possessing certain privileges of sanctuary, became for that reason a nest of mischievous characters, who were generally obnoxious to the law. These privileges were abolished in 1697. The name Alsatia is a Latinized form of Alsace, which, being on the frontiers of France and Germany, was a harbour for necessitous or troublesome characters from both countries. Alsatia figures prominently in Sir Walter Scott's Fortunes of Nigel.

ALSTRŒMERIA, a genus of South American plants belonging to the natural order Amaryllideæ, some of them cultivated in European greenhouses and gardens. *A. Salsilla* and *A. ovata* are cultivated

for their edible tubers. The people of Chile prepare a kind of arrowroot from *A. pallida*; and useful properties are ascribed to some other species.

ALTISCOPE, an instrument, consisting of an arrangement of mirrors in a vertical framework, by means of which a person is enabled to overlook an object (a parapet, for instance) intervening between himself and any view that he desires to see, the picture of the latter being reflected from a higher to a lower mirror, where it is seen by the observer.

ALTRUISM (Italian, *altrui*; Latin, *alter*, other), as opposed to egoism, denotes the unselfish principle of human action; or is applied collectively to those forces in the development of man as an individual and social being which operate in consequence of the efforts of individuals to preserve the life or secure the happiness of others more or less connected with them.

ALUMINIUM BRONZE, an alloy consisting of aluminium and copper, of a yellow colour, resembling gold. The bronze, containing 10 parts of aluminium and 90 of copper, possesses the maximum degree of strength, malleability, and ductility; an increase in the proportion of aluminium renders the alloy weaker and less malleable. It has a specific gravity of 7·689, and a tensile strength of 32 tons per square inch. This metal has been employed in the construction of astronomical and other scientific instruments, and for the working parts of machinery where great durability is requisite. It produces excellent castings of any size, it does not clog the file, and in the lathe and planing-machine the tool removes long elastic shavings, leaving a fine smooth bright surface.

AMAPALA, a seaport of Honduras, Central America, situated on the island of Tigre, in the Gulf of Fonseca, 73 miles from Tegucigalpa, the capital.

AMBATCH (*Herminiera elaphroxylon*), a thorny leguminous shrub with yellow flowers, growing abundantly in the shallows of the Upper Nile and other rivers of tropical Africa. It is from 15 to 20 feet high, and its wood is extremely light and spongy; hence it is made into floats or rafts, one of which to bear eight persons can easily be carried by one.

AMBLETEUSE, a small seaport of France, 6 miles from Boulogne. Here James II. landed on his flight from England in 1688; and from its harbour Napoleon I. prepared to despatch a flotilla of flat-bottomed boats for the invasion of Britain.

AMBLYOPSIS, a genus of blind-fishes, containing only one species, *A. spelæus*, found in the Mammoth Cave of Kentucky. See BLIND-FISH in SUPP.

AMBO, AMBON, in early Christian churches a kind of raised desk or pulpit, sometimes richly ornamented, from which certain parts of the service were read or discourses delivered.

AMBRIZ, a seaport of South-west Africa, in Portuguese territory, on the northern frontier of Angola proper, lat. 8° S., at the mouth of the river Loje. It is the only port of call for steamers plying between Banana and Loanda, and has a good and increasing trade, the chief exports being coffee, ground-nuts, and caoutchouc. The climate is unhealthy.

AMELANCHIER, a genus of small trees, natives of Europe and N. America, allied to the medlar. The species *A. vulgaris*, long cultivated in English gardens, has showy white flowers. *A. Botryapium* (grape-pear) and *A. ovalis*, both American species, yield pleasant fruits.

AMELAND, a low flat island off the north coast of Holland, 13 miles long and 3 broad. The inhabitants (about 2000 in number) are chiefly engaged in fishing and agriculture.

AMÉLIE-LES-BAINS, a village of France in the department of Pyrénées-Orientales, frequented as a winter residence by invalids, and for its warm sulphurous springs. Pop. 1700.

AMENOPHIS (or AMENHOTEP) III., a king of ancient Egypt who reigned about 1500 B.C. He warred successfully against Syrians and Ethiopians, and built magnificent temples and palaces at Thebes, where the so-called Memnon statue is a statue of this king. See EGYPT.

AMENORRHŒA, absence or suspension of menstruation. The former may arise from general debility or from defective development, the latter from exposure to cold, from attacks of fever or other ailment, violent excitement, &c. See MENSTRUATION.

AMETABOLA (Gr. *ametabolos*, unchangeable), a division of insects, including only the apterous or wingless insects, as lice, spring-tails, &c., which do not undergo any proper metamorphosis, but which escape from the egg nearly under the same form which they preserve through life.

AMHERST, JEFFREY, LORD, distinguished British general, was born at Riverhead, Kent, on Jan. 29, 1717, and died in his native county on Aug. 3, 1797. At an early age he became page to the Duke of Dorset, through whom he obtained a post in 1731 as ensign in the Guards. He fought at Dettingen and Fontenoy, and received rapid promotion. In 1758 Pitt raised him to the rank of major-general, and appointed him to the command of a force sent in May of that year to thwart the designs of the French in America. Louisburg in Cape Breton Island was captured, and Amherst was appointed commander-in-chief. In order to effect the capture of Montreal, which was the key of the French position, three lines of attack were simultaneously followed. Of these the most difficult was the capture of Quebec, assigned to the enthusiastic Wolfe, and effected in brilliant fashion at the expense of that general's life. The second was the breaking off of the French communication with Louisiana by the seizure of Fort Niagara; this task cost the life of General Prideaux, but his second-in-command, Sir William Johnson, succeeded in performing it. To Amherst was assigned the third and easiest, but by no means trifling task of capturing Ticonderoga; this he effected in July, 1759, and in the following month he took Crown Point. The three armies converged in 1760 on Montreal, which fell without making an effort to resist. Thus was Canada made a part of the British Empire, and Amherst became governor-general. His reputation was sullied by his obstinacy and lack of judgment during the rebellion of the Indian chief Pontiac, and in 1763 he returned to England. In 1776 he was raised to the peerage, and twenty years later he was appointed field-marshal, after a brief period as commander-in-chief.

AMICE, an oblong piece of linen with an embroidered apparel sewed upon it, worn under the alb by priests of the Roman Catholic Church when engaged in the service of the mass.

AMIEL, HENRI FRÉDÉRIC, Swiss poet and littérateur, was born at Geneva on Sept. 27th, 1821, and died there on March 11th, 1881. He was educated in his native town, and in 1842 travelled in Italy. In the following year he went to Paris, whence he proceeded to Heidelberg and Berlin. During a five years' stay in these cities he was deeply influenced by German thought and German science; and shortly after his return to Geneva he succeeded Pictet in the chair of æsthetics at the academy, a post which he subsequently vacated to become professor of philosophy. During his lifetime he published several volumes of poetry, including Grains de Mil (1854), Il Penseroso (1858), Charles le Téméraire (1877), and Jour à Jour (1880); but his fame rests on his Journal Intime, published in 1883–4 under the editorship of his friend Scherer. It shows great critical power and philosophical knowledge, but through it there runs

a current of melancholy pessimism. An English translation appeared in two volumes in 1885.

AMMONIACUM, a gum-resinous exudation from an umbelliferous plant, the *Dorema ammoniacum*. It has a fetid smell, is inflammable, and is soluble in water and spirit of wine. In medicine it is used as an antispasmodic, stimulant, and expectorant in chronic catarrh, bronchitic affections, and asthma; also for plasters.

AMMONIAPHONE, an instrument consisting of a metallic tube containing some substance saturated with ammonia, peroxide of hydrogen, and a few flavouring compounds, and fitted with a mouthpiece to breathe through. The use of it is said to render the voice strong, clear, rich, and ringing by the inhalation of the ammoniacal vapour.

AMNESIA (Greek *a*, not, *mnēmē*, memory), a singular form of the loss of memory, consisting in a person's forgetting words to such an extent that he cannot speak, read to himself, or write. It is one form of aphasia (which see).

AMOL, a town of northern Persia, 76 miles N.E. of Teheran, near the Caspian Sea, and a little to the west of Barfrush. Extensive ruins tell of former greatness, the most prominent being the mausoleum of Seyed Quam-u-deen, who died in 1378. Pop. in winter estimated at about 40,000. The district contains iron, copper, and lead mines.

AMONTILLADO, a dry kind of sherry of a light colour and body, and not very sweet. It is highly esteemed.

AMOO, or AMOO DARIA. See OXUS.

AMOO-DARIA, a Russian territory of Central Asia, on the east of the Amoo and south-east of the Sea of Aral, bounded on the south by Bokhara and on the west by Sir-daryinsk. A large part is under cultivation, but there are considerable stretches of sandy desert. It contains Kungrat on the Amoo delta, and other important towns. Area, 40,000 sq. miles. Pop. 220,000.

AMORPHOZOA, a term applied to some of the lower groups of animals, as the sponges and their allies, which have no regular symmetrical structure.

AMORTIZATION, in law, the alienation of real property to corporations (that is, in *mortmain*), prohibited by several English statutes.

AMPHISBÆNA (Greek, from *amphis*, both ways, and *bainō*, to go), a genus of serpentiform, limbless, lacertilian reptiles. They have the body cylindrical, destitute of scales, and divided into numerous annular segments; the tail obtuse, and scarcely to be distinguished from the head, whence the old belief that it moved equally well with either end foremost. There are several species, found in tropical America. They feed on ants and earthworms, and were formerly, but erroneously, deemed poisonous.

AMPHIUMA, a genus of amphibians which frequent the lakes and stagnant waters of North America. The adults retain the clefts at which the gills of the tadpole projected, and the animals inhabit muddy waters and often bury themselves in the mud. They are dark-brown in colour, from 1 to 3 feet in length, and have an eel-like shape. Each of their rudimentary legs is furnished with two or with three toes, there being a somewhat remarkable variation in this respect.

AMRAOTI. See OOMRAWATTEE.

AMSTERDAM, a town of Montgomery county, New York state, U.S., on the Mohawk river and the Erie Canal, 33 miles N.W. of Albany. It is a busy manufacturing town, being engaged in the making of carpets, paper, and various other goods. Pop. (1890), 17,336; (1900), 20,929.

AMYGDALOID (Greek *amygdalē*, an almond), a term applied to an igneous rock, especially trap, containing round or almond-shaped vesicles or cavities partly or wholly filled with crystalline nodules of various minerals, particularly calcareous spar, quartz, agate, zeolite, chlorite, &c.

AMYLENE (C_5H_{10}), an ethereal liquid with an aromatic odour, prepared from fusel-oil. It possesses anæsthetic properties, and has been tried as a substitute for chloroform, but, though possessing certain advantages, it does not produce so deep a sleep.

AMYLIC ALCOHOL, one of the products of the fermentation of grain, &c., commonly known by the name of fusel-oil (which see).

ANABOLISM. See METABOLISM in SUPP.

ANARCHISTS, a revolutionary sect or body setting forth as the social ideal the most extreme form of individual freedom, and holding that all government is injurious and immoral, and that the destruction of every social form now existing must be the first step to the creation of a new and better social system. The anarchists are not all animated by quite the same ideals, and whilst many of them are freethinkers, not a few, such as Count Tolstoï, rest their opinions on a Christian basis. The common element in all the different forms of their beliefs seems to be the conviction that the political and economic conditions prevailing in the society of to-day restrict the development of true manhood and individuality. Their recognition as an independent sect may be dated from the secession of the Russian Bakunin and his followers from the Social Democrats at the congress of the Hague in 1872, since which time they have maintained an active propaganda. The Russian Prince Kropotkine is one of the foremost advocates of anarchism, and Élisée Reclus, the distinguished French geographer, preaches the same doctrines. Besides maintaining that all government must be abolished, the anarchists naturally hold that there must be no private property in land or anything else. Their principal journals have been La Révolte (Paris), Freiheit (New York), Liberty (Boston), and the Anarchist (London). The congress at London in 1881 decided that all means were justifiable as against the organized forces of modern society, and many anarchists preach the same doctrine. Others, however, such as Élisée Reclus, protest against this violent view.

ANASTOMOSIS, in animals and plants, the inosculation of vessels, or the opening of one vessel into another, as an artery into another artery, or a vein into a vein. By means of anastomosis, if the course of a fluid is arrested in one vessel it can proceed along others. It is by anastomosis that circulation is re-established in amputated limbs, and in aneurism when the vessel is tied. In the net-veined or reticulated leaves of plants the veinlets anastomose.

ANBURY, called also *club-root* and *fingers and toes*, a disease in turnips and other cruciferous plants, such as cabbages, cauliflowers, and Brussels sprouts, in which knobs or excrescences are formed on the root, and the plants rendered useless for feeding purposes. The disease is due to the growth of a parasitic organism, *Plasmodiophora Brassicæ*, commonly classed with the Myxomycetes or slime-fungi, a group also regarded as animal, and called Mycetozoa. The presence in the soil of a fair proportion of lime is a good preventive, and the application of lime is the most effective remedy.

ANDIJAN, a town in Russian Central Asia, in Turkestan, province of Ferghana, 73 miles to the north-east of Khokand, and now a railway terminus. It is a place of some antiquity, and has belonged to Russia since 1875. It carries on a considerable trade

in raw products and manufactured goods. Pop. (1897), 46,680, mostly Tajiks.

ANDIRA, a genus of leguminous American trees, with fleshy plum-like fruits. The wood is well fitted for building. The bark of *A. inermis*, or cabbage-tree, is narcotic, and is used as an anthelminthic under the name of *worm-bark* or *cabbage bark*. The powdered bark of *A. araroba* is used as a remedy in certain skin diseases, as herpes.

ANDIRONS, horizontal iron bars raised on short legs, with an upright standard at one end, used to support pieces of wood when burning in an open hearth, one andiron being placed on each side of the hearth.

ANDKHOO, or ANDKHOUI, a town of Afghanistan, about 200 miles S. of Bokhara, on the commercial route to Herat. It is a very unhealthy place, but is somewhat important as a centre of caravan traffic. Pop. estimated at 15,000.

ANDRASSY, COUNT JULIUS, Hungarian statesman, was born at Zemplin on Mar. 8th, 1823. He took part in the revolution of 1848, and was condemned to death, but escaped and went into exile. In 1860 he returned to Hungary and soon became an active member of the Hungarian parliament; and when self-government was restored to his country in 1867 he became premier. From 1871 till his retirement from public life in 1879 he was imperial minister for foreign affairs, and in that capacity he directed his efforts towards the maintenance of peace between Austria-Hungary and the neighbouring powers. He took an important part in the Berlin Congress of 1878, and it was through his influence that Austria was empowered to occupy Bosnia and Herzegovina. He latterly sat as a member of the Hungarian upper house. He died on 18th February, 1890.

ANDROPOGON, a large genus of grasses, mostly natives of warm countries. *A. schœnanthus* is the sweet-scented lemon-grass of conservatories. Others also are fragrant.

ANGELUS, in the Roman Catholic Church a short form of prayer in honour of the incarnation, consisting mainly of versicles and responses, the angelic salutation three times repeated, and a collect, so named from the word with which it commences: '*Angelus* Domini' (Angel of the Lord). Hence, also, the name is given to the bell tolled in the morning, at noon, and in the evening, to indicate the time when the angelus is to be recited.

ÅNGERMANN, a river of northern Sweden in the province of the same name. It rises on the Norwegian border, and falls into the Gulf of Bothnia after a course of some 170 miles. It forms a number of lakes and waterfalls, and is noted for its fine scenery. It is navigable for nearly 70 miles for vessels of 600 tons. The town of Hernösand is situated at its mouth.

ANGEVINS, natives of Anjou. The term Angevin kings is often applied to the race of English sovereigns called Plantagenets (which see).

ANGLO-CATHOLIC, a term sometimes used to designate those churches which hold the principles of the English Reformation, that is, the Anglican or Established Church of England and the allied churches. The term is also applied in a more restricted sense to that party in the English Church which favours doctrines and religious forms closely approaching those of the Roman Catholic Church, objects to be called Protestant, and corresponds in various ways with the *Ritualistic* section of the Church or the High Church party. See TRACTARIANISM and other articles.

ANGRA PEQUENA (Portuguese, 'little bay'), a bay on the west of Namaqualand, in German Southwest Africa, where the German commercial firm Lüderitz in 1883 acquired a strip of territory and established a trading station. In 1884, notwithstanding some weak protests of the British, Germany took under her protection the whole coast territory from the Orange River to 26° S. lat., and soon after extended the protectorate to the Portuguese frontier, but not so as to include the British settlement of Walfisch Bay. Though the inlet affords good anchorage very little trade has been developed, chiefly owing to the scarcity of water and the unfertile character of the district. The Penguin Islands here, which belong to Cape Colony, have yielded considerable quantities of guano.

ANGUIS. See BLIND-WORM.

ANGUS, a name of Forfarshire. It gives the Duke of Hamilton the title of Earl of Angus.

ANHOLT, an island belonging to Denmark, in the Cattegat, midway been Jutland and Sweden, 7 miles long, 4½ broad, largely covered with drift-sand, and surrounded by dangerous banks and reefs. There is a lighthouse on the island and a light-ship in the neighbourhood. Pop. 170.

ANICHE, a town of northern France, department of Nord, arrondissement of Douai. There are here important coal-mines, glass-works, chemical works, &c. Pop. (1901), 6927.

ANILISM, aniline poisoning, a name given to the aggregate of symptoms which often show themselves in those employed in aniline works, resulting from the inhalation of aniline vapours. It may be either acute or chronic. In a slight attack of the former kind, the lips, cheeks, and ears become of a bluish colour, and the person's walk may be unsteady; in severe cases there is loss of consciousness. Chronic anilism is accompanied by derangement of the digestive organs and of the nervous system, headaches, eruptions on the skin, muscular weakness, &c.

ANNA, an Anglo-Indian money of account, the sixteenth part of a rupee, and of the value of 1½*d.*

ANNABON. See ANNOBON.

ANNISTON, a town of the United States, in Calhoun County, Alabama, 60 miles to the north-east of Birmingham, founded in 1872. It has rolling-mills, and various other works. Pop. (1900), 9695.

ANNULOIDA, in some modern zoological classifications, a division (sub-kingdom) of animals, including the Rotifera, Scolecida (tape-worms, &c.), all which are more or less ring-like in appearance, and the Echinodermata, whose embryos show traces of annulation.

ANNULOSA, a division (sub-kingdom) of animals regarded by some as synonymous with the Arthropoda or Articulata; according to other systematists, including both the Articulata and Annulata or worms.

ANOA (*Anoa depressicornis*), an animal closely allied to the buffalo, but only about the size of an average sheep. It inhabits the rocky and mountainous localities of the island of Celebes, and is very wild and fierce. The horns are short and almost straight, and extend backward nearly in a line with the forehead, but bending somewhat downwards. An allied form is found in the island of Mindoro in the Philippines.

ANOBIUM, a genus of coleopterous insects, the larvæ of which often do much damage by their boring into old wood. Several are known by the name of *death-watch*. *A. striatum*, a common species, when frightened, is much given to feigning death.

ANODE (Gr. *ana*, up, *hodos*, way), the positive pole of the voltaic current, being that part of the surface of a decomposing body which the electric

current enters. The term is opposed to *cathode* (Gr. *kata*, down, *hodos*, way), the way by which it departs.

ANOMALURE (*Anomalurus*), a genus of rodent animals inhabiting the west coast of Africa, resembling the flying-squirrels, but having the under surface of the tail 'furnished for some distance from the roots with a series of large horny scales, which, when pressed against the trunk of a tree, may subserve the same purpose as those instruments with which a man climbs up a telegraph pole to set the wires'. They are called also scale-tails, or scale-tailed squirrels, but some authorities class them with the porcupines rather than the squirrels. There are several species of them, but little is known of their habits.

ANONA, a genus of plants, the type of the natural order Anonaceæ. *A. squamosa* (sweet-sop) grows in the West Indian Islands, and yields an edible fruit having a thick, sweet, luscious pulp. *A. muricata* (sour-sop) is cultivated in the West and East Indies; it produces a large pear-shaped fruit, of a greenish colour, containing an agreeable slightly acid pulp. The genus produces other edible fruits, as the common custard-apple or bullock's heart, from *A. reticulata*, and the cherimoyer of Peru, from *A. Cherimolia*.

ANSTED, David Thomas, an English geologist, was born in London in 1814. He graduated at Jesus College, Cambridge, in 1836; and during the next few years he held various teaching posts, including that of professor of geology at King's College, London. From 1844 till 1847 he was assistant-secretary to the Geological Society, whose quarterly journal he edited for many years. His numerous works, both scientific and popular, had a wide circulation, and the former were for a time standard authorities. He died at Woodbridge, Suffolk, in 1880.

ANTACID, an alkali, or any remedy for acidity in the stomach. Dyspepsia and diarrhœa are the diseases in which antacids are chiefly employed. The principal antacids in use are magnesia, lime, and their carbonates, and the carbonates of potash and soda.

ANTALO, a town of Abyssinia in the kingdom or district of Tigre, of which it was the capital for a short time at the beginning of the nineteenth century. It has suffered much from wars and has now only a small population. It stands at a height of about 8000 feet, and is about 140 miles E.N.E. of Gondar.

ANTHEM, originally a hymn sung in alternate parts; in modern usage, a sacred tune or piece of music set to words taken from the Psalms or other parts of the Scriptures, first introduced into church service in Elizabeth's reign; a developed motet. The anthem may be for one, two, or any number of voices, but seldom exceeds five parts, and may or may not have an organ accompaniment written for it. The anthem has developed from great simplicity to considerable elaboration, and is a peculiarly English form of music. It was first recognized as an integral part of the national church music early in Elizabeth's reign; and amongst those who are known as anthem-writers we may note Tye, Tallis, Gibbons, Wise, Blow, Purcell, Croft, Boyce, Attwood, Walmisley, Handel, Mendelssohn, S. S. Wesley, Goss, Ouseley, and Bennett.

ANTHEMION, an ornament or ornamental series used in Greek and Roman decoration, which is derived from floral forms, more especially the honeysuckle. It was much used for the ornamentation of friezes and interiors, for the decoration of fictile vases, the borders of dresses, &c.

ANTHEMIS, a genus of composite plants, comprising the camomile or chamomile. See Camomile.

ANTHERIDIUM, the male reproductive organs of many cryptogamous plants. From them escape the antherozoids, which move by means of cilia towards the oogonium or archegonium containing the female cells. See Reproduction.

ANTHESTERIA, an annual Greek festival held in honour of all the gods, more particularly of Bacchus or Dionysus, and to celebrate the beginning of spring, and the season when the wine of the previous vintage was considered fit for use. It formed the third of the four great Attic festivals in honour of Dionysus, and lasted three days. It is supposed that comedies, and probably also tragedies, were represented on this occasion.

ANTHRACOSIS, a disease of the lungs, which attacks colliers and charcoal-workers. It is caused by the inhalation of coal-dust, very fine particles of which penetrate the lobes of the lungs, and set up chronic inflammation. The diseased portions of the lung are stained a dark colour. Unless the sufferer is quickly removed from the dust-laden atmosphere, death generally ensues. A similar disease, *lithosis*, or Stone-mason's Disease, is caused by the inhalation of particles of stone.

ANTHROPOMETRY (from the Greek *anthrōpos*, man, and *metron*, measure), the science which has for its object the systematic examination of the height, weight, and other physical characteristics of the human body. Wide research has for many years back been made in this direction, by authorities such as Quetelet and Quatrefages, but an extensive collection and systematic arrangement and comparison of the statistics available have been the work of recent years. In 1875 the British Association appointed a committee to collect observations in connection with this department, and in 1883 they submitted to the association their final report, from which we extract the following interesting and valuable information. The variations in stature, weight, and complexion existing in different districts of the British Isles appear to be chiefly due to difference of racial origin, and this influence predominates over all others. We have reason to believe, from historical and antiquarian researches, that the ancient Caledonii, the Belgæ, and Cimbri, and the Saxons and Frisians, as well as the Danes and Normans, were all people of great stature. On the other hand, the prehistoric (neolithic) race or races of Britain appear to have been of low or moderate stature. Accordingly the higher statures are found in the Pictish and Cimbro-British districts of Galloway; in the Anglo-Danish districts of North and East Yorkshire, Westmoreland, and Lincolnshire, and in Cumberland, whose people are ethnologically intermediate between the two. Lothian and Berwickshire are mainly Anglian, while the Perthshire Highlanders are the most clearly identified as the descendants of the Caledonii. Norfolk holds a high position in regard to stature, owing to a large admixture of Danish blood on the coast. There is a fringe of moderately high stature all round the coast from Norfolk to Cornwall, while the inland people, retaining more of the ancient British blood, yield lower averages. Middlesex and Hertfordshire, which stand very low, were later and less perfectly colonized by the Anglo-Saxons than the surrounding counties, and nearly the same may be said of the counties surrounding the Severn estuary and the Welsh border. Cornwall stands higher than the surrounding counties, and this is probably due to its having become the refuge of the military class of South Britain, in the main of Belgic origin. Flint and Denbigh owe their superiority to the other Welsh counties to the immigration of the Cumbrian and

Strathclyde Britons. The inhabitants of the western provinces of Ireland possess a high stature similar to that found in the Scotch Highlands, with which they may have a common racial origin, while the lower stature of the eastern provinces is probably traceable to the comparatively recent Scotch and English immigrations. As to geographical distribution, the inhabitants of the more elevated districts possess a greater stature than those of alluvial plains. The counties forming the river-valleys of the Severn and Wye, the Thames, the Dee, and Mersey, the Clyde, the Trent, and the fen district of Cambridge and Huntingdon, show a lower stature than the surrounding counties inhabited by persons of a similar racial origin. With respect to latitude and climate, the inhabitants of the northern and colder districts possess greater stature than those of the southern and warmer parts of the island; those of the north-eastern and drier regions are taller than those of the south-western and damper climates. A similar disposition of stature has been found to exist in France and Italy, the inhabitants of both these countries being taller in the northern than in the southern provinces. The same rule applies to the whole of the countries of Europe with respect to each other. Grouping the observations according to the place of birth in England, Wales, Scotland, and Ireland the general results may be summarized as follows:—The Scotch male adults stand first in height (68·71 inches), the Irish second (67·90 inches), the English third (67·36 inches), and the Welsh last (66·66 inches). In weight the Scotch take the first place (165·3 lbs.), the Welsh the second (158·3 lbs.), the English the third (155·0 lbs.), and the Irish the last (154·1 lbs.). For each inch of stature a Scotchman weighs 2·406 lbs., a Welshman 2·375 lbs., an Englishman 2·301 lbs., and an Irishman 2·270 lbs. The chest-girth of the adult British male (the measurements being, however, mainly those of Englishmen) varies from 45 to 27 inches, the mean being 36 inches. The strength of the arms exerted as in drawing a bow ranges from 150 to 30 lbs., the mean being 70 lbs. The average height of adult females in England is 62·65 inches, being 4·71 inches less than the male average; the average weight of females is 122·8 lbs., being 32·2 lbs. under that of the males. The females are stated to average little more than half the strength of males measured by straining the arms, but the observations were obtained from pupils in training schools for mistresses, and from shop assistants, so that the average is no doubt much lower than if the labouring classes had been included. The average height of the adult males of the principal races or nationalities of the world may be given as under; but more numerous measurements might alter some of the figures considerably:—Polynesians 69·33 in., Patagonians 69 in., Negroes of the Congo 69 in., Scotch 68·71 in., Iroquois Indians 68·28 in., Irish 67·90 in., United States (whites) 67·67 in., English 67·66 in., Norwegians 67·66 in., Zulus 67·19 in., Welsh 66·66 in., Danes 66·65 in., Dutch 66·62 in., American Negroes 66·62 in., Hungarians 66·58 in., Germans 66·54 in., Swiss 66·43 in., Belgians 66·38 in., French 66·23 in., Berbers 66·10 in., Arabs 66·08 in., Russians 66·04 in., Italians 66 in., Spaniards 65·66 in., Esquimaux 65·10 in., Papuans 64·78 in., Hindus 64·76 in., Chinese 64·17 in., Poles 63·87 in., Finns 63·60 in., Japanese 63·11 in., Peruvians 63 in., Malays 62·34 in., Lapps 59·2 in., Bosjesmans 52·78 in. The average stature of man is thus about 65·25 inches. With respect to the measurement of children at birth it is found that the average length of a British male infant is 19·52 in., and of females 19·32 in. The average naked weight of male infants is 7·12 lbs., of females 6·94 lbs. Growth is most rapid during the first five years of life, and during that period the rate of increase is about the same in both sexes, the gain being 21·51 in. From 5 to 10 years boys grow a little more rapidly than girls, the male increase being 10·81 in., the female 10·50 in. From 10 to 15 years girls grow more rapidly than boys, and at the ages of 11½ to 14½ are actually taller, and from 12½ to 15½ actually heavier than boys. From 15 to 20 years boys again take the lead and grow at first rapidly then gradually slower, and complete their growth at about 23 years. After 15 girls grow very slowly, and attain their full stature about the 20th year. The strength of males increases rapidly from 12 to 19 years and at a rate similar to the weight; more slowly and regularly up to 30 years, after which it declines at an increasing rate to the age of 60. The strength of females increases at a more uniform rate from 9 to 19 years, more slowly to 30, after which it falls off in a manner similar to that of males.

ANTICYCLONE, a phenomenon presenting some features opposite to those of a cyclone. It consists of a region of high barometric pressure, the pressure being greatest in the centre, with light winds flowing outwards from the centre, and not inwards as in the cyclone, accompanied with great cold in winter and with great heat in summer.

ANTIETAM, a small stream in the United States which falls into the Potomac about 50 miles N.W. Washington. It was the scene of an indecisive battle between the Federal and Confederate armies on 16th and 17th September, 1862. The battle is also named after Sharpsburg.

ANTIFRICTION METAL, a name given to various alloys of tin, zinc, copper, antimony, lead, &c., which oppose little resistance to motion, with great resistance to the effects of friction, so far as concerns the wearing away of the surfaces of contact. Babbitt's metal (50 parts tin, 5 antimony, 1 copper) is one of them.

ANTI-LEBANON, the eastern of the two parallel ranges known as the Mountains of Lebanon in Palestine. See LEBANON.

ANTIOQUIA, a town of South America, in Colombia, on the river Cauca; founded in 1542. Its site is hot but not specially unhealthy, and gold is obtained in the neighbourhood. Pop. 10,000. It gives name to a department of the republic, which is generally mountainous and rich in the precious metals; area, 22,316 square miles; pop. 470,000. The capital is Medellin.

ANTIPODES ISLANDS, a group of small uninhabited islands in the South Pacific Ocean, about 460 miles S.E. by E. of New Zealand, to which they belong; so called from being nearly antipodal to Greenwich. Antipodes Island rises to 1300 feet, and is largely covered with coarse grass. Huts have recently been fitted up on the island to shelter castaways.

ANTIPYRETICS (Gr. *anti*, against, *pyretos*, fever), a name for a class of drugs having the special effect of reducing fever or feverish symptoms. They include antipyrin, salicin, and especially quinine, but the nature of their action is not understood.

ANTIPYRIN is a drug obtained from coal-tar products, and recently introduced in medicine. It is prepared in the form of a white crystalline powder, or in tabloids; it has a peculiar sweetish-bitter taste; and is colourless when dissolved in water. It causes profuse perspiration, and given in doses of from 10 to 30 grains will reduce the temperature, in a case of fever, with great rapidity. In typhoid fever, in blood-poisoning, in scarlet fever, and in other fevers it is very serviceable. In a case of true nervous headache relief can be obtained in a

very short time by a dose of 10 or 15 grains. After taking this drug the patient is liable to catch cold, and ought, if possible, to lie down for some time in a quiet room.

ANTISANA, a volcano in the Andes of Ecuador, in the eastern chain of the Cordilleras, a little to the south of the equator, and about 40 miles S.E. by E. of Quito. Whymper, who ascended it in 1880, makes its height 19,335 feet. On its side is Tambo de Antisana, at the height of about 13,400 feet, one of the highest inhabited places on the globe.

ANTITOXIN (Greek *anti*, against, *toxikon*, poison), a substance having the effect of counteracting poison in the animal system, especially of counteracting toxins or poisonous matters generated in the system in consequence of the attack of some serious disease, and through the introduction of the bacilli or germs characteristic of the particular disease. It has long been known that certain diseases attack a person or an animal only once, the subject being henceforth *immune* or protected against a second attack, as in the case of small-pox. This led to the practice of inoculation to produce immunity artificially. Recently it was discovered that the blood or blood-serum of animals rendered immune exercises an antitoxic or protective effect when introduced into the blood of other animals, and hence arose the method of treatment known as *serotherapy*, which, so far as the human subject is concerned, seems to have been especially successful in the case of diphtheria. The antitoxic serum employed as a remedy or prophylactic against this disease is obtained from the blood of horses inoculated with the bacilli of diphtheria, the animals having been subjected to a series of inoculations with stronger and stronger doses, continued over a period of some length. Certain diseases of domestic animals have been treated on similar lines.

ANTI-TRADE, a name given to any of the upper tropical winds which move northward or southward in the same manner as the trade-winds which blow beneath them in the opposite direction. These great aerial currents descend to the surface after they have passed the limits of the trade-winds, and form the south-west or west-south-west winds of the north temperate, and the north-west or west-north-west winds of the south temperate zones.

ANTIVARI, a seaport town on the eastern shore of the Adriatic, about 25 miles to the S.E. of Cettinje, ceded to Montenegro by the Treaty of Berlin (1878). It carries on some trade, but the harbour is not deep enough for large vessels. It is the seat of a Roman Catholic archbishop. Pop. about 6000.

ANTOFAGASTA, a Chilian seaport and a province of the same name. The province has an area of about 46,500 square miles, and a population of 113,000, and though largely a desert, contains great mineral wealth. The port is situated on the Bay of Morena, and is connected with districts rich in silver, cubic nitre, and other minerals by a railway which runs inland into Bolivia. Antofagasta has risen since 1870, and now has a considerable trade, exporting silver, copper, cubic nitre, &c. Pop. (1907), 32,496.

ANTONELLI, GIACOMO, cardinal, was born at Sonnino, Italy, on April 2, 1806, and died on November 6, 1876. He was educated at the Grand Seminary of Rome, where he attracted the attention of Pope Gregory XVI., who appointed him to several important offices. On the accession of Pius IX. in 1846 Antonelli was raised to the dignity of cardinal-deacon; two years later he became president and minister of foreign affairs, and in 1850 was appointed secretary of state. During the sitting of the Œcumenical Council (1869–70) he was a prominent champion of the papal interest. He strongly opposed the assumption of the united Italian crown by Victor Emanuel. He left a large sum of money, a share of which was claimed by his reputed daughter, the Countess Lambertini, but without success.

ANÚPSHAHR, a town of Hindustan, in the United Provinces, on the Ganges, 75 miles S.E. of Delhi, a resort of Hindu pilgrims who bathe in the Ganges. Pop. (1901), 8601.

ANURA, or ANOURA (Greek *a*, negative, *oura*, a tail), an order of Batrachians which lose the tail when they reach maturity, such as the frogs and toads. See BATRACHIA.

AOUDAD, the *Ammotragus tragelaphus*, a quadruped allied to the sheep, most closely to the moufflon, from which, however, it may be easily distinguished by the heavy mane, commencing at the throat and falling as far as the knees. It is a native of North Africa, inhabiting the loftiest and most inaccessible precipices.

APHTHÆ, a disease occurring especially in infants, but occasionally seen in old persons, and consisting of small white ulcers upon the tongue, gums, inside of the lips, and palate, resembling particles of curdled milk. It is also called *thrush* or *milk-thrush*.

APIA, the chief place and trading centre of the Samoa Islands, on the north side of the island of Upolu. The buildings are partly of a European character, and include schools, churches, hotels, and other like buildings. The population consists largely of British, Germans, and Americans. A short distance west of Apia is Malua, containing the London Missionary Society's training college. The port is an open roadstead, sheltered during the trade-wind season, but dangerous during that of the hurricanes or from December till April. In 1889 three German and three American war-ships, besides several other vessels, were wrecked here.

APLACENTAL, a term applied to those mammals in which no placenta is developed during gestation, the young not being connected with the system of the mother as in the placental mammals, and being brought forth in a very undeveloped condition. The aplacental mammals comprise the Monotremata and Marsupialia, the two lowest orders of mammals, including the duck-mole (ornithorhynchus), the porcupine ant-eater, kangaroo, &c. See MARSUPIALIA and MONOTREMATA.

APOLLINARIS WATER, a natural aërated water, belonging to the class of acidulated soda-waters, and derived from the Apollinarisbrunnen, a spring in the valley of the Ahr, near the Rhine, in Rhenish Prussia. It forms a highly esteemed beverage, and is exported in very large quantities. The spring was discovered in 1853, and is now in the hands of a limited liability company.

APOLLONIUS OF TYRE, the Syrian hero of a tale which had an immense popularity in the middle ages, being translated into all the chief languages of Europe, and which furnished the plot of Shakspere's Pericles, Prince of Tyre. The story, originally in Greek, first appeared in the third century after Christ.

APOLLOS, a Jew of Alexandria, who learned the doctrines of Christianity at Ephesus from Aquila and Priscilla, became a preacher of the gospel in Achaia and Corinth, and an assistant of Paul in his missionary work. A party of Christians at Corinth claimed to be distinctively followers of Apollos, and were rebuked by Paul for cherishing this divisive spirit. Some have regarded him as the author of the Epistle to the Hebrews.

APOSIOPESIS, in rhetoric, a sudden break or

stop in speaking or writing, usually for mere effect or a pretence of unwillingness to say anything on a subject; as, 'his character is such—but it is better I should not speak of *that*'.

APPENDICULATA, a great division or phylum of invertebrate animals, so named from their having certain *appendicula* or appendages attached to the body rings of which each is made up. Each hollow ring normally possesses a pair of hollow appendages moved by special muscles. The Appendiculata comprise the Arthropoda (animals with jointed limbs such as the insects, crustacea, &c.), Rotifera, and Chætopoda.

APPETITE, in its widest sense, means the natural desire for gratification, either of the body or the mind; but is generally applied to the recurrent and intermittent desire for food. A healthy appetite is favoured by work, exercise, plain living, and cheerfulness; absence of this feeling, or defective appetite (*anorexia*), indicates diseased action of the stomach, or of the nervous system or circulation, or it may result from vicious habits. Depraved appetite (*pica*), or a desire for unnatural food, as chalk, ashes, dirt, soap, &c., depends often in the case of children on vicious tastes or habits; in grown-up persons it may be symptomatic of dyspepsia, pregnancy, or chlorosis. Insatiable or canine appetite or voracity (*bulimia*), when it occurs in childhood, is generally symptomatic of worms; in adults common causes are pregnancy, vicious habits, and indigestion caused by stomach complaints or gluttony, when the gnawing pains of disease are mistaken for hunger. See Dyspepsia, Dietetics, &c.

APPLE OF DISCORD, according to the story in the Greek mythology, the golden apple thrown into an assembly of the gods by the goddess of discord (Eris), bearing the inscription 'for the fairest'. Aphroditē (Venus), Hera (Juno), and Pallas (Minerva) became competitors for it, and its adjudication to the first by Paris so inflamed the jealousy and hatred of Hera to all of the Trojan race (to which Paris belonged) that she did not cease her machinations till Troy was destroyed. This story is introduced in Tennyson's Œnone.

APPLE OF SODOM, a fruit described by old writers as externally of fair appearance, but turning to ashes when plucked. It is probably the fruit of *Solanum sodomeum*, a native of the northern parts of Africa, which when eaten may produce delirium and even death.

APPLETON, a town of Wisconsin, U.S., 100 miles N.W. of Milwaukee by rail. It stands on the banks of the Lower Fox river, and has flour, paper, saw, and woollen mills, and other manufactories. It is the seat of a collegiate institute and of Lawrence University. Pop. (1890), 11,869; (1900), 15,085.

APPOMATTOX COURT-HOUSE, a village in Virginia, U.S., 20 miles E. of Lynchburg. Here on 9th April, 1865, General Lee surrendered to General Grant, and thus virtually concluded the American civil war.

APSHERON, a peninsula on the western shore of the Caspian Sea formed by the eastern extremity of the Caucasus Mountains. It extends into the sea for about 40 miles, and terminates in Cape Apsheron. It yields immense quantities of petroleum. See Baku.

APTERYX, a peculiar genus of Cursorial or Running Birds, forming the type of and coextensive with the family Apterygidæ. In this family the bill is long and slender, and the nostrils are at the tip of the bill. The hinder toe is well developed, and the claws of all the toes are long and powerful. The scientific name is derived from the rudimentary nature of the wings. As in other cursorial birds, the barbs of the feathers hang loose and disconnected, and are not united to form a web. Four species have been described, all inhabiting New Zealand. These birds are nocturnal in habits, and are hunted at night by the natives for the sake of their skins and plumage. Of these, *A. australis* (often called by the native name of 'kiwi-kiwi') is the best known. (See figure in plate at article Ornithology.) The average height of the apteryx is about 2 feet, the general colour being a dark-brown, the feathers being tipped each with a darker tint. The average weight is about 4 lbs. The eggs measure each about 4 inches long, and weigh between 14 and 15 ozs. It is probable that the apteryx will in no long time become extinct.

ARABI PASHA, Egyptian soldier and revolutionary leader, was born in 1837 in the condition of a Fellah, and entered the army, in which his abilities soon raised him to the rank of an officer. In Sept. 1881 he headed a military revolt, which sought to secure administrative independence and representative government for Egypt, and was for a time virtually dictator. Britain interfered to put an end to the subversion of her authority in Egypt, and after a short campaign, beginning with the bombardment of Alexandria in July, 1882, and ending with the defeat of Arabi and his army at Tel-el-Kebir, he surrendered, and was banished to Ceylon in 1883 (but has been allowed to return). See Egypt.

ARACEÆ, a natural order of monocotyledonous plants, mostly tropical, having the genus Arum as the type. They are most prominently characterized by their inflorescence, which consists of a spadix protected by a spathe. Most of the species have tuberous roots abounding in starch, which forms a wholesome food after the acrid (and even poisonous) juice has been washed out. See Arum, Caladium, Dumb-cane (the two last in Supp.).

ARAGONA, a town in Sicily, 8 miles N.N.E. of Girgenti. Almonds are produced, and sulphur is obtained in the district. Pop. (1901), 14,215. In the neighbourhood is the mud volcano of Macculuba.

ARAGUAYA, a Brazilian river, principal affluent of the Tocantins. It rises about the 18th degree of S. lat.; in its course northwards forms the boundary between the two states of Matto Grosso and Goyaz, and falls into the Tocantins near lat. 6° S. Its length is about 1100 miles, of which over 700 miles of its middle course are navigable, but below this navigation is interrupted by falls and rapids. The watershed between this river and the Parana system is low and easily crossed.

ARALIA, a genus of plants with small flowers arranged in umbels, and succulent berries, the type of the natural order Araliaceæ, which is nearly related to the Umbelliferæ, but the species are of a more shrubby habit. They are natives chiefly of tropical or sub-tropical countries, and in Britain are represented by the ivy. Ginseng also belongs to the order. From the pith of *A. papyrifera* is obtained the Chinese rice-paper.

ARANY, Janos, Hungarian poet, was born at Nagy Szalonta on Mar. 2nd, 1817, and died at Pesth on Oct. 22nd, 1882. He was the son of poor parents, and for some time was a strolling player; but became professor of Latin at the Normal School of Szalonta, professor of Hungarian literature at Nagy Körös, and secretary of the Hungarian Academy. He gained a prize offered by the Kisfaludy Society for his poem of The Lost Constitution. Of his other works we may mention his trilogy on Toldi, the Samson of Hungarian Folk-lore (1847); Conquest of Murány (1848); Katalin, a continuation of Toldi; and Buda Halála. Arany is regarded as second only to Petöfi amongst the poets of modern Hungary. He also made his countrymen familiar with Sopho-

cles, Aristophanes, Goethe, Shakspere, and Burns through his excellent translations.

ARAPAIMA, a genus of South American fresh-water fishes, of the order Physostomi, family Osteoglossidæ, one species of which (*A. gigas*) grows to the length of 15 or 16 feet, and forms a valuable article of food in Brazil and Guiana. It is covered with large bony scales, has a bare and bony head, wide gill-openings, and a rounded tail-fin. It is both eaten fresh and is also salted, dried, and smoked. The natives often catch it by shooting it with the bow and arrow.

ARAS (the ancient *Araxes*), a river of Armenia, rising south of Erzerum at the northern foot of the Bingol-dagh. It flows for some miles through Turkish territory north-east to the new Russian frontier. Here it turns eastwards to the Erivan plain north of Ararat, whence it sweeps in a semicircle mostly between the Russian and Persian territories round to its confluence with the Kur, 60 miles from its mouth in the Caspian. Its length is about 600 miles.

ARAVALLI HILLS, a range of Indian mountains running N.E. and S.W. across the Rajputána country, which they separate into two natural divisions—desert plains on the N.W. and fertile lands on the S.E. The highest point, Mount Abu (5653 feet), is situated in a somewhat isolated position at the southern extremity of the range. They are penetrated by the Dasuri pass.

ARAXES. See ARAS above.

ARBOGA, an old Swedish city, in the province of Westmannland, about 70 miles to the south-west of Upsala. It was once an important commercial town, but is now only of historical interest from having been at one time a residence of the family of Vasa, the scene of church assemblies and national diets, and for the antiquities in its neighbourhood. Pop. (1899), 5187.

ARCACHON, a town of south-western France, in the department of Gironde, about 30 miles south-west of Bordeaux, on the almost landlocked basin of Arcachon, a much-frequented bathing-place, with great oyster-rearing establishments. The town stretches along the shore, and is sheltered by sand-hills and pine-woods. It is connected by railway with Bordeaux. Pop. (1906), 9006.

ARCHÆAN ROCKS (Gr. *archaios*, ancient), the oldest rocks of the earth's crust, crystalline in character, and embracing granite, syenite, gneiss, mica-schist, &c., all devoid of fossil remains. These rocks underlie and are distinctly separate from the stratified and fossiliferous formations, which indeed have chiefly taken origin from them. See GEOLOGY.

ARCHÆOPTERYX, a unique fossil bird from the oolitic limestone of Solenhofen, of the size of a rook, and differing from all known birds in having two free claws representing the thumb and forefinger projecting from the wing, and about twenty tail vertebræ free and prolonged as in mammals. It forms a sort of connecting link between birds and reptiles.

ARC-LIGHT. See ELECTRIC LIGHTING.

ARDAHAN, a small fortified town about 6400 feet above the sea, between Kars and Batúm in Russian Armenia, some 40 miles to the north-west of the former. Like Kars it is a place of great strategic importance, but its climate is rather severe. It was captured by the Russians in 1877, and ceded to them by the Berlin treaty, 1878.

ARDEA, the genus to which the heron belongs, type of the family Ardeidæ, which includes also cranes, storks, bitterns, &c.

ARDEBIL, or ARDABIL, a Persian town in the province of Azerbijan, near the Karasu, a tributary of the Aras, about 40 miles from Astara on the shore of the Caspian, in an elevated and healthy situation. It has mineral springs and a considerable trade. Pop. 20,000.

ARGENTITE, sulphide of silver, a blackish or lead-gray mineral, a valuable ore of silver found in the crystalline rocks of many countries. See SILVER.

ARGIVES, or ARGIVI, the ancient term for the inhabitants of Argos in the Peloponnesus. By Homer and other ancient authors it was often used as a generic appellation for all the Greeks.

ARGYLL, GEORGE DOUGLAS CAMPBELL, eighth DUKE OF, the only surviving son of the seventh duke, was born on April 30th, 1823, at Ardincaple Castle, Dumbartonshire, and succeeded his father in the ducal title in 1847. Before this he had made himself well-known in Scotland by various pamphlets on the questions at issue between the different sections of the Scottish Church, in which, as in everything affecting the welfare of his native country, he has always shown an active interest. In 1852 he first held a government office, having become lord privy seal under the Earl of Aberdeen, and since that date he has played a prominent part in political life. On several subsequent occasions he held office as lord privy seal, and under Lord Palmerston he was post-master-general. In 1868 Mr. Gladstone appointed him secretary of state for India, and he held this post till the downfall of the government in 1874. In Mr. Gladstone's second ministry he was lord privy seal, but resigned in April, 1881, because he could not support the Irish Land Bill. From that time he steadily drifted away from the policy of his former leader, was a resolute opponent of the home rule policy, whether as represented by the bill of 1886 or by that of 1893, and was an influential member of the Liberal-Unionist party. He died at Inveraray Castle on April 24, 1900. His writings are numerous, and include many papers on scientific, historical, and speculative questions. Amongst his principal works are The Reign of Law (1866); Primeval Man (1869); The Unity of Nature (1884); Scotland as it Was and as it Is (1887); The Unseen Foundations of Society (1893); The Philosophy of Belief, or Law in Christian Theology (1896); What is Science? (1898); and Organic Evolution Cross-examined (1898). His eldest son, then Marquis of Lorne, in 1871 married H.R.H. Princess Louise, fourth daughter of Queen Victoria. In 1878–83 he was Governor-general of Canada, and in 1895–1900 M.P. (Unionist) for South Manchester. His publications include Imperial Federation, Canadian Pictures, Life of Palmerston, Life and Times of Queen Victoria (1901), &c.

ARIL, ARILLUS, in some plants, as in the nutmeg, an extra covering of the seed, outside of the true seed-coats, and falling off spontaneously. It is either succulent or cartilaginous, coloured, elastic, rough, or knotted. In the nutmeg it is known as *mace*.

ARISTOLOCHIA, a genus of plants, the type of the order Aristolochiaceæ, which consists of dicotyledonous monochlamydeous plants, with an inferior 3–6-celled fruit, principally inhabiting the hotter parts of the world, and in many cases used medicinally on account of their tonic and stimulating properties. The genus has emmenagogic qualities, especially the European species *A. rotunda*, *A. longa*, and *A. Clematitis*. *A. bracteata* is used in India as an anthelmintic; *A. odoratissima*, a West Indian species, is a valuable bitter and alexipharmic. *A. serpentaria* is the Virginian snake-root popularly regarded as a remedy for snake-bites.

ARJISH DAGH, the loftiest peak of the peninsula of Asia Minor, at the western extremity of the Anti-Taurus Range; height 13,150 feet. It is an extinct volcano, and on the north and north-eastern slopes are extensive glaciers.

ARMADALE, a town of Scotland, in Linlithgowshire, about 2½ miles to the westward of Bathgate. It stands in the midst of a mineral field producing coal, iron, limestone, and brick-clay; and near it are chemical and paraffin works. Pop. (1901), 3919.

ARMAGEDDON, the great battle-field of the Old Testament, where the chief conflicts took place between the Israelites and their enemies—the tableland of Esdraelon in Galilee and Samaria, in the centre of which stood the town Megiddo, on the site of the modern Lejjun. The name is used figuratively in the Apocalypse to signify the place of 'the battle of the great day of God'.

ARMSTRONG, William George, Baron Armstrong, the son of a Newcastle merchant, was born Nov. 26, 1810. He was educated at the Bishop Auckland school, and was afterwards articled to a solicitor in Newcastle, who ultimately took him into partnership. The scientific bent of his mind, however, caused him to give up the legal profession and devote himself entirely to those pursuits in which he has since gained a world-wide reputation. His hydro-electrical machine was produced in 1842, and his hydraulic crane in 1845; and in 1847 he founded the famous Elswick works in order to carry out the manufacture of his already numerous inventions. The year 1854 saw the production of the Armstrong rifled gun (see Armstrong Gun), and in 1858, on the recommendation of the Rifle Cannon Committee, it was adopted by the government for special service. The inventor at the same time was made a Companion of the Bath, received a knighthood, and was appointed engineer of rifled ordnance to the government. This position he resigned in 1863 in order to develop the Elswick company, which has since become one of the largest manufacturing firms in the world. The gun of 1858 underwent many improvements during the next few years, and the principle of its construction was extended to guns of other sizes. Lord Armstrong, who was elevated to the peerage in 1887, was a member of many learned societies, received honorary degrees from both Cambridge and Oxford, and was decorated with many foreign orders. He was president of the British Association at its Newcastle meeting in 1863, and in his address on that occasion he called attention to the wasteful manner in which coal is employed, and to the possible exhaustion of the coal supply of Britain, thus leading to the appointment of a royal commission on the subject. He figured as a vigorous opponent of the existing patent laws, and took part in several inquiries concerning their operation. He died on Dec. 27, 1900. He published several works, besides pamphlets and articles.

ARMY AGENT. See Agent (Army).

ARMY CORPS, a war unit between the divisional command and the army head-quarters, first introduced under the name *corps d'armée* by the French in the closing years of the eighteenth century, and soon afterwards adopted by other European nations. It was created because the increasing size of armies, combined with other causes, made it practically impossible to control them by a central authority acting through commanders of divisions. A British army corps as projected is under a general officer, and consists, when for home defence, of a staff, three divisions of infantry, and corps troops. Each infantry division, under the command of a lieutenant-general, consists of a staff, two infantry brigades, and divisional troops, the latter comprising a cavalry squadron, a brigade-division of three field batteries, a reserve ammunition column, a field company of engineers, a company of the army service corps (see next art.), and a field hospital. The brigade-division and the ammunition column are commanded by a lieutenant-colonel, generally taking his orders from the commander of the division. Each infantry brigade includes the staff, four battalions of eight companies of infantry, a detachment of infantry with two machine-guns, a company of the army service corps, and a bearer company, and is under the command of a major-general. The corps troops referred to above as forming part of the army corps are directly under the general commanding, and consist of a battalion of infantry with two machine-guns, a squadron of cavalry distributed among the divisions, an artillery staff, a brigade-division of two field batteries, another of three horse-artillery batteries, five ammunition columns, a field company of engineers, a bridging troop, half a telegraph battalion; a field park with reserves of tools, one company of the army service corps, and two companies of signallers, one mounted and one not. On foreign service the army corps has more ammunition columns in the corps troops, a balloon section, a bakery column of 120 ovens attached to two army service corps companies, and seven more field hospitals. The total strength of a British army corps will amount to 1158 officers, &c., 33,952 other ranks, and 10,164 horses. The army corps of Germany, France, Austria, and Russia have an almost identical organization, but they usually contain more squadrons of cavalry, more men, and more guns. For the army-corps districts arranged under Mr. Brodrick's scheme of 1901 see the article Army.

ARMY SERVICE CORPS, a special section of the British army, having companies attached to each brigade, division, and army corps (see preceding art.). Its duties are concerned with the provision of food for men and horses, the performance of transport services, the managing of barracks, stables, &c., and certain other minor requirements of an army. It was first organized in 1870, and took over the duties of the former commissariat department and the military train. Its administration is vested in the quartermaster-general, and an assistant quartermaster-general, with head-quarters at the War Office, exercises the functions of commanding officer. The dismounted section has its depôt at Aldershot, and comprises about 950 clerks, tradesmen, &c.; the mounted section numbers about 2200, and has depôts at Aldershot and Woolwich. It comprises 34 companies, namely, 6 at Woolwich, 4 each at Curragh and Dublin, 2 each at London, Shorncliffe, Devonport, and Portsmouth, and other two unequally divided between Chatham and Colchester. Each company is commanded by a captain, under whom is a subaltern and a warrant-officer. The reserve numbers between 2000 and 3000. Men enlist for three years with the colours and nine in the reserve. The corps is not employed in India.

ARMY WORM, the very destructive larva of the moth *Heliophila* or *Leucania unipuncta*, so called from its habit of marching in compact bodies of enormous number, devouring almost every green thing it meets. It is about 1½ inch long, greenish in colour, with black stripes, and is found in various parts of the world, but is particularly destructive in North America. The larva of *Sciara militaris*, a European two-winged fly, is also called army worm.

ARNOLD, Sir Edwin, son of Robert Coles Arnold, Esq., J.P., was born at Gravesend on June 10th, 1832, and received his earlier education at King's School, Rochester, and King's College, London. He then passed to University College, Oxford, where he gained the Newdigate prize in 1852, the subject of the poem being The Feast of Belshazzar. He graduated with honours in 1854, and, leaving college, was elected second English master in King Edward's School, Birmingham. Two years later he went to

Poona, Bombay, as principal of the government Deccan College, a position which he resigned in 1861 in order to return to England. From that time he was a member of the staff of the Daily Telegraph newspaper. The honour of Companion of the Star of India was conferred on him in 1877, and that of Knight Commander of the Indian Empire in 1888. He died on March 24, 1904. Many of his works, both prose and verse, treat of Oriental subjects. The most notable among them are The Light of Asia (1879), an epic on Buddha's life and philosophy, which has had a very large sale in England and America; an edition of the well-known Sanskrit work, The Hitopadesa; The Book of Good Counsels, a metrical translation of the foregoing; The Indian Song of Songs (1875); Indian Poetry (1801); Pearls of the Faith, or Islam's Rosary (1883); With Sádi in the Garden (1888); The Light of the World (1891), a poem on the life of Christ; Adzuma (1893), a Japanese tragedy; and the Tenth Muse (1895). In 1888 he issued, under the title Poems, National and Non-Oriental, a volume containing most of his English poems published before that date and several new ones. He was married three times, his last wife being a Japanese lady.—His brother Sir Arthur, born 1833, made himself prominent as a politician, and as a writer on political and social subjects, of works of travel, &c. He was made a Knight of the Bath in 1895, and died on May 20, 1902.

AROOSTOOK, a river of the north-eastern U. States and New Brunswick, a tributary of the St. John; length, 120 miles. Nearly the whole of its course is in the state of Maine.

ARREST OF JUDGMENT, in law, the staying or stopping of a judgment after verdict, for causes assigned. Courts have power to arrest judgment for intrinsic causes appearing upon the face of the record; as when the declaration varies from the original writ; when the verdict differs materially from the pleadings; or when the case laid in the declaration is not sufficient in point of law to found an action upon.

ARRETIUM. See Arezzo.

ARRHENATHERUM, a genus of oat-like grasses, of which *A. elatius*, sometimes called French rye-grass, is a valuable fodder plant.

ARROW LAKE, an expansion of the Columbia River, in British Columbia, Canada; about 95 miles long from N. to S. It is often regarded as forming two lakes—Upper and Lower Arrow Lake.

ARUWIMI, a large river of equatorial Africa, having its source in the hills to the west of Albert Nyanza, and flowing westwards through the Belgian territory to join the Congo on the north bank at Aruwimi or Basoko. Its length is a little over 800 miles, and its breadth at its confluence with the Congo is about a mile. It is navigable up to Yambuya, but beyond that place there are many rapids. In its upper course it is called the Ituri. Stanley discovered its mouth in 1877, and subsequently traced a considerable part of its course.

ASABA, a town of the British region in Western Africa known as Southern Nigeria, stands on the right bank of the Niger, in lat. 6° 30′ N., lon. 6° 41′ E. Here resides the chief justice of the supreme court, and here, too, are the central prison, hospitals, and other public buildings.

ASARABACCA, a small hardy European plant of the natural order Aristolochiaceæ (*Asarum europæum*). Its reniform leaves are acrid, bitter, and nauseous, and its root is extremely acrid. Both the leaves and root were formerly used as an emetic. It entered into the composition of medicated snuffs recommended in cases of headache. The flowers are brownish-purple, and their stalks are much shorter than the petioles of the leaves. The plant is occasionally found wild in British woods. Several other species of the genus, especially *A. canadense*, are cultivated.

ASCOMYCETES, a large group of fungi, so called from their spores being contained in asci or sacs. This group includes mildews, rusts, smuts, the truffle, the morel, and (according to those who follow Schwendener) the lichens. See Fungi.

ASCOT, a famous English race-course in Berkshire, adjacent to the south-western extremity of the great park of Windsor. The races, which take place in the second week in June, constitute, for value of stakes and quality of horses, the best meeting of the year, as it is the most fashionable. They were instituted during the early part of the eighteenth century. There are many fashionable residences in the neighbourhood.

ASGARD (literally, gods' yard, or the abode of the gods), in Scandinavian mythology, the home of the gods or *Æsir*, rising, like the Greek Olympus, from *midgard*, or the middle world, that is, the earth. It was here that Odin and the rest of the gods, the twelve Æsir, dwelt—the gods in the mansion called Gladsheim, the goddesses dwelling in Vingulf. Walhalla, in which heroes slain in battle dwelt, was also here. Below the boughs of the ash-tree Ygdrasill the gods assembled every day in council. See Northern Mythology.

ASGILL, John, an eccentric English writer, was born in Worcestershire in 1659, and died in November, 1738. He was called to the bar at the Middle Temple in 1692. In 1699 he published a pamphlet to prove that Christians were not necessarily liable to death, death being the penalty imposed for Adam's sin and Christ having satisfied the law. Having crossed over to Ireland, he was beginning to get into a good practice, and was elected to the Irish House of Commons for Enniscorthy, when his pamphlet was ordered to be burned by the public hangman, and he himself was expelled the house. His whole subsequent life was passed in pecuniary and other troubles, mostly in the Fleet or within the rules of the King's Bench. He published other works, mostly of the same type as his best-known one.

ASHBURTON, Alexander Baring, Lord, a British statesman and financier, was born in 1774. A younger son of Sir Francis Baring, he was bred to commercial pursuits, which for some years kept him in the United States and Canada, and in 1810 he became head of the great firm of Baring Brothers and Co. After serving in Parliament for many years he was raised to the peerage in 1835, having previously been president of the Board of Trade in Peel's government (1834–35). In 1842 he went to the United States as a special ambassador, and whilst there he concluded the Ashburton Treaty. Though in his earlier years he had been in favour of freeing commerce from many restrictions, the free-trade proposals found in him a strong opponent. He died on May 13th, 1848. See next art.

ASHBURTON TREATY, a treaty concluded at Washington, 1842, by Alexander Baring, Lord Ashburton (see preceding article), and the President of the United States. It defined the boundaries between the States and Canada, &c.

ASHLAND, a town of the U. States, in the anthracite region of Pennsylvania, in the county of Schuylkill. Its industries embrace machinery, mining, &c. Pop. (1900), 6438.—The name is also given to a town in Wisconsin, close to Lake Superior, with coal and iron mines. Of late years it has become a place of great commercial and industrial importance. Pop. (1900), 13,074.

ASHTAROTH, a goddess worshipped by the

ancient Canaanites, and regarded as symbolizing the productive powers of nature, being probably the same as Astarte (which see). *Ashtaroth* is a plural form, the singular being *Ashtoreth*.

ASHTON-IN-MAKERFIELD, a town of Lancashire, England, 4 miles from Wigan, with collieries, cotton-mills, manufactures of various tools, screws, locks, &c. Pop. (1891), 13,379; (1901), 18,695.

ASKABAD, a town of Asiatic Russia, the administrative centre of the Russian Trans-Caspian territory, situated in the Akhal Tekke oasis, and forming one of the chief stations on the Trans-Caspian railway. It was occupied by Skobeleff in January 1881, after the sack of Geok Tepé. Its distance from Merv is 232 miles, from Herat 388 miles. It contains barracks and a considerable garrison. Pop. (1897), 19,428.

ASNIÈRES, a town of France, practically a north-western suburb of Paris. Pop. (1901), 31,336.

ASOKA (*Jonesia asoca*), an Indian tree, of the natural order Leguminosæ, sub-order Cæsalpineæ, having a lovely flower, showing orange, scarlet, and bright-yellow tints. It is sacred to the god Siva, and often mentioned in Indian literature.

ASPIDIUM, a genus of ferns of the natural order Polypodiaceæ. See SHIELD-FERN in SUPP.

ASPLENIUM, a genus of ferns of the natural order Polypodiaceæ. See SPLEENWORT in SUPP.

ASPROMONTE, a mountain of Italy in the south-west of Calabria, where Garibaldi was wounded and taken prisoner with the greater part of his army, on August 28th, 1862.

ASSAB, a bay in north-eastern Africa, in the Italian colonial territory of Erythræa, on the coast of the Red Sea. Here is an Italian station and settlement declared a colony and free port by Italy on January 9, 1881, being the first Italian acquisition of territory in this quarter. The trade has attained dimensions of some importance.

ASSEMBLY, NATIONAL, a body set up in France on the eve of the revolution. Upon the convocation of the States-general by Louis XVI. the privileged nobles and clergy refused to deliberate in the same chamber with the commons or *tiers-état* (third estate). The latter, therefore, on the proposition of the Abbé Siéyès, constituted themselves an *assemblée nationale*, with legislative powers (June 17, 1789). They bound themselves by oath not to separate until they had furnished France with a constitution, and the court was compelled to give its assent. In the 3250 decrees passed by the assembly were laid the foundations of a new epoch, and having accomplished this task it dissolved itself, Sept. 30, 1791. According to the present constitution of France the senate and the chamber of deputies form a national assembly when they unite together for the election of a president of the republic. See FRANCE.

ASSIOUT, or ASSIUT. See SIOUT.

ASTARA, a Russian town in Transcaucasia, situated on the western shore of the Caspian Sea, on the line of separation between the government of Baku and the Persian province of Azerbijan. It is a place of considerable trade.

ASTATIC NEEDLE, a magnetic needle having another needle of the same intensity fixed parallel to it, the poles being reversed, so that the needles neutralize one another, and are unaffected by the earth's magnetism: used in the *astatic galvanometer*. See MULTIPLIER.

ASTIGMATISM, a defect of the eye which is due to the cornea having different degrees of curvature in different directions. Usually in such cases the vertical meridian is more curved than the horizontal, and consequently rays of light passing through the former are brought to a focus sooner than those passing through the latter. Thus the rays of light from an object are not brought to a single focus, and so the object has a blurred appearance. Astigmatism exists in all eyes to some extent, and it is only when excessive that the defect becomes an inconvenience requiring correction. The lenses used for this purpose are ground from a cylinder, instead of from a sphere, as in ordinary glasses; they are plane in one direction and either concave or convex in the other. The glass must be so placed that the direction of the curve is placed over the meridian requiring correction, and its curvature must be made to suit the degree of the defect. When, as frequently happens, astigmatism is associated with short-sight or long-sight, the choice of spectacles becomes a more difficult task. Very often astigmatism is congenital.

ASTOR, JOHN JACOB, one of the merchant princes of New York city, was born in Germany, near Heidelberg, 17th July, 1763. His boyhood was spent working on his father's small farm, but at the age of sixteen he entered the business of an elder brother who had established himself as a musical-instrument maker in London. In 1783 he sailed for the United States with a small stock of musical instruments, which on the advice of a fellow-passenger he exchanged in New York for furs. These, on his return to London, he sold at a considerable profit. Returning soon after to New York he engaged eagerly in the fur trade, and by the end of the century did an extensive business in all the fur markets of the world. In 1811 the settlement of Astoria at the mouth of the Columbia river was formed to serve as a central depot for the fur trade from the lakes to the Pacific, but during the following year Astoria was occupied by the English, and the scheme fell through. Astor vastly increased his wealth by investing in real estate in New York, and at the time of his death (29th March, 1848) his fortune was estimated at £5,000,000. Among the many beneficent public donations in his will was that of a sum of £80,000 to found a library in New York, an institution of which Washington Irving was the first president. The Astor Library is contained in a splendid building, enlarged in 1859 at the cost of his eldest son William, and comprises about 200,000 volumes. This son (born 1792, died 1875) left at his death a fortune estimated at £10,000,000 sterling.

ASTORGA, a city of Spain, in the province of Leon; the *Asturica Augusta* of the Romans. It is picturesquely situated on a height above the river Tuerto, and is partly surrounded by massive walls with semicircular towers, dating from the Roman period. It has a Gothic cathedral dating from 1471, and containing fine work in sculpture and other branches of art. It figured prominently during the Peninsular war; was taken by the French after an obstinate defence in 1810; and retaken by the Spaniards in 1812. Pop. (1900), 5573.

ASTORIA, a town of Oregon, U. States, on the Columbia river, with numerous salmon-canning establishments. Pop. (1900), 8381. See ASTOR in SUPP.

ASTRAGALUS, the upper bone of the foot supporting the tibia; otherwise known as the huckle, ankle, or sling bone. It is a strong, irregularly-shaped bone resting on the heel-bone, and is connected with the others by powerful ligaments.

ASTRAGALUS, a genus of papilionaceous plants, herbaceous or shrubby, and often spiny. *A. gummifer* yields gum tragacanth. See TRAGACANTH in SUPP.

ASTRAL SPIRITS, spirits formerly believed to people the heavenly bodies or the aerial regions. In the middle ages they were variously conceived as fallen angels, souls of departed men, or spirits originating in fire, and belonging neither to heaven,

earth, nor hell. Paracelsus regarded them as demoniacal in character.

ASTROCARYUM, a genus of tropical American palms, species of which yield oil and valuable fibre. Tucum oil and tucum thread are obtained from *A. vulgare*. See TUCUM in SUPP.

ASWAIL, or ASWAL, the native name for the sloth-bear (*Ursus* or *Melursus labiatus*), an animal found over the greater part of India and in Ceylon, an uncouth, unwieldy creature, with very long black hair, long lips and mobile snout, inoffensive when not attacked. Its usual diet consists of fruits, honey, grubs, ants, &c. Its flesh is in much favour as an article of food. When captured young it is easily tamed and shows considerable intelligence and affection.

ATAVISM (L. *atavus*, an ancestor), in biology, the tendency to reproduce the ancestral type in animals or plants which have become considerably modified by breeding or cultivation; the reversion of a descendant to some peculiarity of a more or less remote ancestor. For information on this subject various works of Darwin may be consulted, particularly his Variation of Plants and Animals.

ATAXY, ATAXIA, in medicine, irregularity in the animal functions, or in the symptoms of a disease. See LOCOMOTOR ATAXY in SUPP.

ATHELING, a title of honour among the Anglo-Saxons, meaning one who is of noble blood. The title was gradually confined to the princes of the blood royal, and in the ninth and tenth centuries is used exclusively for the sons or brothers of the reigning king. One of those who are best known by this title was Edgar Atheling, the weak, vacillating grandson of Edmund Ironside, and the brother of Saint Margaret, queen of Malcolm Canmore.

ATHEROMA, a term in medical science applied to a diseased condition or degeneration in the walls of arteries resulting from inflammation or ulceration. If the degeneration has passed deeply into the substance of the wall of the blood-vessel that part will be seriously weakened, so that it may stretch or burst, an aneurism being produced.

ATHERTON, a town of England, in Lancashire, 13 miles north-west of Manchester, with cotton-factories, collieries, iron-works, &c., employing a large number of the inhabitants. Pop. (1901), 16,211.

ATLANTIC CITY, a fashionable watering-place of the United States, on the coast of New Jersey, 60 miles south-east of Philadelphia. Hotels and boarding-houses are very numerous; there are electric cars, and a plank-walk or marine promenade 4 miles long in front of the town. Pop. (1910), 46,150. In the summer the population often exceeds 100,000.

ATMIDOMETER, an instrument for measuring the evaporation from water, ice, or snow. It somewhat resembles Nicholson's hydrometer, being constructed so as to float in water and having an upright graduated stem, on the top of which is a metal pan. Water, ice, or snow is put into the pan, so as to sink the zero of the stem to a level with the cover of the vessel, and as evaporation goes on the stem rises, showing the amount of evaporation in grains.

ATMOLYSIS, the separation of a mixture of gases into its components by diffusion through a porous membrane or other body.

ATMOMETER, an instrument for measuring the amount of evaporation from a moist surface in a given time. It is often a thin hollow ball of porous earthenware in which is inserted a graduated glass tube. The cavity of the ball and tube being filled with water and the top of the tube closed, the instrument is exposed to the free action of the air; the relative rapidity with which the water transuding through the porous substance is evaporated, is marked by the scale on the tube as the water sinks.

ATOLL, the Polynesian name for coral islands of the ringed type inclosing a lagoon in the centre. They are found chiefly in the Pacific in archipelagos, and are occasionally of large size. Suadiva Atoll measures 44 miles by 34; Rimsky is 54 by 20. See CORAL.

ATRATO, a river of South America, in the north-west of Colombia, emptying itself by a number of mouths into the Gulf of Darien. It is navigable by steamers of some size for 250 miles, and has long been the subject of schemes for establishing water-communication between the Atlantic and the Pacific; but such projects seem latterly to have been entirely given up.

ATREK, a river of western Asia, forming in its lower course the boundary between Persia and the Russian Trans-Caspian territory, and flowing into the Caspian. Its length is about 250 miles, but the volume of water is small.

ATTACHÉ, a junior member of the diplomatic service attached to an embassy or legation. Besides the unpaid attachés, whose duties are partly secretarial, the chief British embassies include military, naval, and commercial attachés. These, in addition to advising the ambassador on technical points, have to keep a careful watch over British interests in their special departments. See MINISTERS (FOREIGN).

ATTLEBOROUGH, a manufacturing town of the United States, in Bristol county, Massachusetts, 30 miles to the south-west of Boston. Its manufactures include jewellery, clocks, &c. Pop. (1900), 11,335. In 1885 North Attleborough was made a separate town. Its population is 6727.

ATTOCK, a town and fort of India, in Rawal Pindi district, Punjab, overhanging the Indus at the point where it is joined by the Kabul river. It is at the head of the steam navigation of the Indus, and is connected with Lahore and Peshawar by a railway, which crosses the river here by means of a bridge completed in 1883. It is an important post on the route to Afghanistan. Pop. (1901), 2822.

ATTORNEY-GENERAL, in England and Ireland, is the first ministerial law officer of the crown, specially appointed by letters patent. It is his duty to exhibit informations and to prosecute for such crimes as tend to disturb the peace of the state, or endanger the constitution; to give legal advice to the heads of the various departments of government, to conduct all suits and prosecutions connected with the recovery of the revenue of the crown, and generally to appear in all English and Irish courts when the interests of the crown are concerned. The attorney-general and the solicitor-general (who has a similar position and ranks next to the attorney-general) have place and audience at the head of the English bar. The solicitor-general has full power to act in all cases in the absence of the attorney-general, and almost invariably succeeds to his office should it fall vacant. Both these officials are usually members of the House of Commons and vacate office with the administration to which they belong.

ATUI, or VATUI, one of the Hervey or Cook's Islands. It has a circumference of 20 miles and a population of about 1200.

AUBERVILLIERS, a suburban locality of Paris, with a fort belonging to the defensive works of the city. Pop. (1901), 31,125.

AUCKLAND ISLANDS, a group of islands about 200 miles S. of New Zealand (in latitude corresponding with the south of England), discovered in 1806, and belonging to Britain. They are of volcanic origin and are mountainous in character, rising to the height of 1300 to 2000 feet. The

largest, which is 25 miles by 15, has two good harbours. The climate is wet and stormy. They are clothed with a luxuriant vegetation, including trees of large size, many brilliant flowers, and even tree-ferns. The birds include parrots, pigeons, &c., most of the species being peculiar to these islands. There are no settled inhabitants. The islands form a dependency of New Zealand.

AUCUBA, a genus of plants of the order Cornaceæ, one species of which, *A. japonica*, a laurel-like shrub with spotted leaves, a native of Japan and China, is now common in ornamental grounds in Europe. The flowers are dicœcious and inconspicuous. For a long time only the female plant was cultivated, but latterly the male has been introduced, and the fruit, which consists of beautiful coral-red berries, is now frequently developed, and adds greatly to the attractiveness of the plant. *A. himalaica*, also brought to Europe, has leaves of a uniform green and is less hardy.

AUDLEY, a town of North Staffordshire, England, 5 miles north-west from Newcastle-under-Lyme. The district abounds in mines of excellent coal and ironstone which give employment to a great number of the inhabitants. Pop. (1901), 13,679.

AUERBACH, a town of Germany, in the kingdom of Saxony, district of Zwickau and about 14 miles to the south-west of that town. It has a fine Protestant church in the Gothic style, normal seminary, &c., and manufactures of curtains and similar goods. Pop. (1895), 8136; (1900), 9555.

AUERBACH, Berthold, a celebrated German novelist and miscellaneous writer, was born of Jewish parents, 28th February, 1812, at Nordstetten, a village of Würtemberg in the Black Forest. He was educated at the Talmudic Institute of Hechingen, at Carlsruhe, at Stuttgart, and at the universities of Tübingen, Munich, and Heidelberg. In 1836 he published a pamphlet on the Jewish Nation and Modern Literature, which was followed by Spinoza, a romance (1837); Dichter und Kaufmann (Poet and Merchant, 1839). In 1841 he published a translation of Spinoza's works, preceded by a critical biography of the philosopher. Two years later he collected and published a series of tales of peasant life which he had contributed to various periodicals, and which were destined to achieve his first popular literary success. These were the Schwarzwälder Dorfgeschichten (Black Forest Village Tales), which within a year were translated into English, Dutch, and Swedish, and, as time rolled on, into nearly every other European language. In 1853–54 appeared a second series of Village Tales, which were not, however, received so favourably as the first. The more important of his succeeding novels are Barfüssele (Little Barefoot, 1856); Joseph im Schnee (1860—translation by Lady Wallace, Joseph in the Snow, 1861); Edelweiss (1861); Auf der Höhe (1865—translation, On the Heights, 1871); Das Landhaus am Rhein (1869—translation, The Country House on the Rhine, 1870); a third series of Village Tales (1876—translation 1877); Der Förstmeister (1879—translation, The Forester, 1881); Brigitta (1880—translation 1880). Auerbach is also the author of various works on political, social, and educational subjects, which exercised considerable influence in their day, and of several dramas which met with but moderate success. He died at Cannes 8th February, 1882.

AUGUSTINS, Augustines, or Augustinians, members of several monastic fraternities who follow rules framed by the great St. Augustine, or deduced from his writings, of which the chief are the Canons Regular of St. Augustine, or Austin Canons, and the Begging Hermits, or Austin Friars. The Austin Canons were introduced into Britain about 1100, and had about 170 houses in England and about 25 in Scotland. They took the vows of chastity and poverty, and their habit was a long black cassock with a white rochet over it, having over that a black cloak and hood. The Austin Friars, originally hermits, were a much more austere body, went barefooted, and formed one of the four orders of mendicants. An order of nuns had also the name of Augustines. Their garments, at first black, were latterly violet.

AULAPOLAY, or Alleppi, a seaport on the south-west coast of Hindustan, in Travancore, between the sea and a lagoon, with a safe roadstead all the year round. It has a lighthouse, and exports timber, coir, cocoa-nuts, &c. There is here a palace of the Maharajah of Travancore. Pop. (1891), 22,768; (1901), 24,918.

AULLAGAS, or Poopo, a salt or brackish lake of Bolivia, in the department of Oruro, in the south-west of the country, 80 miles long by 20 in breadth. It receives the surplus waters of Lake Titicaca through the Rio Desaguadero, and has only one perceptible insignificant outlet, so that what becomes of its superfluous water is still a matter of uncertainty.

AUMALE, Henri-Eugène-Philippe Louis d'Orléans, Duc d', son of Louis Philippe, king of the French, was born at Paris on Jan. 16th, 1822. In 1847 he succeeded Marshal Bugeaud as governor-general of Algeria, where he had distinguished himself in the war against Abd-el-Kader. After the revolution of 1848 he retired to England in order to devote himself to literary work; but he returned to France in 1871, and was elected a member of the assembly. In the same year he became a member of the French Academy in succession to Montalembert. He was appointed inspector-general of the army in 1879, and was expelled along with the other royal princes in 1886, but was allowed to return. He wrote a History of the House of Condé (Histoire des Princes de Condé; vol. seventh and last appeared in 1895); Les Institutions Militaires de la France (1867); several pamphlets, of which the chief is his Lettre sur l'Histoire de France (1861); and other historical and political works. He died on May 7, 1897.

AUNGERVILLE, Richard, commonly known as Richard de Bury (from his birthplace Bury St. Edmund's), English statesman, bibliographer, and correspondent of Petrarch, was born in 1281, and died at Auckland in 1345. He entered the order of Benedictine monks, and became tutor to the Prince of Wales, afterwards Edward III. Promoted to several offices of dignity, he ultimately became Bishop of Durham and Lord-chancellor of England. During his frequent embassies to the Continent he made the acquaintance of many of the eminent men of the day. He was a diligent collector of books of all kinds, and formed a library at Oxford in connection with Durham College there, but the books were dispersed at the dissolution of the monasteries, Durham College being abolished. He is author of Philobiblon (first printed at Cologne in 1473), a work about books by one who had a genuine love for them; Epistolæ Familiarium, including letters to Petrarch, &c.

AURANGABAD, a town of India, in Hyderabad or the territory of the Nizam, near the north-west boundary of the country, 175 miles from Bombay, and on the Kaum river, a small tributary of the Godavery. It is surrounded by walls of masonry of moderate height, with semicircular towers at the different angles. It contains a ruined palace of Aurengzebe and a mausoleum erected to the memory of his favourite wife. A mile to the west of the town are cantonments for cavalry, infantry, and

artillery. Aurangabad was founded early in the seventeenth century, and rose to be a considerable trading centre, but its commercial importance decreased when Hyderabad became the capital of the Nizam. In late years the trade has revived considerably, and embraces wheat, cotton, and manufactured goods. Pop. (1901), 36,837.

AURANTIACEÆ, the orange order of plants. See ORANGE.

AURICULA (*Primula Auricula*), a beautiful species of primrose, a native of the Swiss mountains, of Austria, Syria, and the Caucasus, and prized by florists as one of their finest flowers, both for its beauty and its delicious fragrance. Its leaves are obovate, entire or serrated, and fleshy, varying, however, in form in the numerous varieties. The flowers are borne on an erect umbel and central scape with involucre. The original colours of the corolla are yellow, purple, and variegated, and there is a mealy covering on the surface. Auriculas are propagated by dividing the root, or by rooted slips, and by seed for obtaining new varieties. The best time for taking off slips or dividing the root is after the plant has done flowering. The operation is therefore generally performed in July and the beginning of August.

AURILLAC, a town of France, capital of the department of Cantal, agreeably situated in a valley watered by the Jordanne (here crossed by a handsome bridge), about 270 miles south of Paris. The public buildings include two fine churches (one dating from the tenth century), the square tower of an ancient fortress, a communal college, normal school, public library and museum. Among goods manufactured are glue, paper, lace, tapestry, cutlery, leather, &c. Pop. (1906), 16,681.

AUROCHS, a species of wild bull or buffalo, the *urus* of Cæsar, *bison* of Pliny, the European bison, *Bos* or *Bonassus Bison* of modern naturalists. It is closely akin to the American bison (buffalo), but is larger and less shaggy. This animal was once abundant in Europe, but were it not for the protection afforded by the Emperor of Russia to a few herds which inhabit the forests of Lithuania it would soon be extinct.

AURORA, an American city, of Kane county, Illinois, on Fox river, 40 miles W. by S. of Chicago. It has flourishing manufactures, railway works, and a considerable trade. Pop. (1910), 29,807.

AUSSIG, a town of northern Bohemia, in a fertile and picturesque district, near the junction of the Biela with the Elbe, on the left bank of which latter it is situated, 42 miles N.N.W. of Prague. It has extensive manufactures of chemicals, ladies' dress stuffs, machinery, glass, earthenware, colours, &c., and is an important centre of trade both by land and river. It has a town-house, a church with picture of the Madonna by Carlo Dolce, monument of Joseph II., &c. It is a place of considerable antiquity, and was at one time strongly fortified. Pop. (1900), 37,255.

AUSTIN, a town of the United States, capital of the state of Texas, on the Colorado, about 200 miles from its mouth, and accessible to steam-boats during certain seasons. There is a state university and other institutions, and a splendid capitol built of red granite. It carries on a trade in cotton, wool, cattle, &c. Pop. (1890), 14,575; (1910), 29,860.

AUSTIN, ALFRED, English poet, born near Leeds, May 30, 1835, of Roman Catholic parents, received his early education at Stoneyhurst and St. Mary's College, Oscott. He graduated as B.A. at the University of London in 1853, and four years later he was called to the bar. During the next three years he attended the courts, but, on the death of his father in 1861, he definitely abandoned the law and determined to devote himself to literature. In that year he published his first important work, a satire, in verse, entitled The Season; and since then his most important poems have been: The Human Tragedy (1862, final form 1889); The Golden Age (1871); Savonarola (a tragedy, 1881); English Lyrics (1890); Fortunatus the Pessimist (1892), a didactic drama; Alfred the Great, England's Darling (1896); and Flodden Field: a Tragedy (1903). In 1890–91 there appeared a collective edition of his works in six volumes, containing, besides some of the above, The Tower of Babel (1890); Prince Lucifer (1887); and Lyrical and Narrative Poems. He has contributed largely to the Quarterly Review and the Standard newspaper, and during the Franco-German war he acted as correspondent for the latter. He is also known as a novelist and a pamphleteer, his most important production in the latter capacity being Tory Horrors (1876), a reply to Mr. Gladstone's Bulgarian Horrors. In 1883 the National Review was founded by him in conjunction with Mr. W. J. Courthope, and for the next ten years he was its editor. The Marquis of Salisbury in 1896, about four years after the death of Tennyson, appointed him poet laureate. Among the laureates he may be considered to hold a fairly respectable rank, and in regard to his general merits and position the following words of a critic in the Athenæum may be quoted: 'His verse is for the most part refined and musical, and the eccentricities into which he sometimes falls, and the discordant notes which he occasionally strikes, are not sufficiently numerous to injure the general effect. . . . If Mr. Austin is not destined to a place among the immortals, he yet stands far higher in our estimation than the great majority of his poetical contemporaries.'

AUSTIN, JOHN, celebrated English jurist, was born in Suffolk on Mar. 3rd, 1790. At sixteen he entered the army, but after five years sold his commission, and studied for the bar, to which he was called in 1818. Becoming acquainted with James Mill and his son, John Stuart Mill, he went through a course of reading in law with the latter. Marrying in 1820, his house in Queen Square, Westminster, was frequented by a brilliant society, including Bentham, the Mills, Carlyle, and Sydney Smith. Austin was too slow and too methodically thorough in small matters for success at the bar. In 1825 he gave up his small practice, and in 1826 he accepted the chair of jurisprudence in the newly founded University of London. He began his lectures in 1828 after two years' study in Germany; but, though he was a zealous student and eloquent in exposition, his class, never large, dwindled to such a meagre number that in 1832 he resigned. In the same year appeared his work The Province of Jurisprudence Determined, which was at first little read and less appreciated. In 1833 he was appointed a member of the Criminal Law Commission, resigned next year, and in 1836 was appointed with Sir George Cornwall Lewis to inquire into the administration and state of government of Malta. Their reports were very valuable. From 1841 to 1848 Austin lived much on the Continent, latterly in Paris, which he left at the revolution of 1848. He settled at Weybridge in Surrey, where he passed the remainder of his life very quietly, writing little, but maintaining his interest in his favourite subjects. He died in December, 1859. In 1861 his wife issued a new edition of The Province of Jurisprudence, and in 1863 two volumes of his lectures. As a philosophical writer on jurisprudence Austin holds a very high rank. His wife, Sarah Taylor (one of the Taylors of Norwich), translated various works from the French and German, and wrote some original works. His daughter,

Lady Duff Gordon, also became known as an author.

AUTOPSY, a term used as equivalent to a *post-mortem* examination.

AUTOTYPE, a species of photographic print. A thin sheet of gelatine on paper is rendered sensitive to light by treatment with bichromate of potash, and then exposed under an ordinary photographic negative. The portions of gelatine affected by the light become insoluble, the remainder of the gelatine is then washed away, and the picture remains reproduced in the gelatine, there being slight elevations and depressions corresponding with the distribution of light and shade. This may be printed from, but it is more often made use of to obtain electrotypes or other reverses, from which impressions can more easily be taken.

AVALON, a sort of fairy-land or elysium mentioned in connection with the legends of King Arthur, being his abode after disappearing from the haunts of men. Another form of the name is *Avilion*. For a description of 'the island-valley of Avilion' see The Passing of Arthur in Tennyson's Idylls of the King.

AVENS, the English name of two rosaceous plants of the genus Geum. Common avens, or herb-bennet, *G. urbanum*, possesses astringent properties, and was formerly used in medicine. The water avens, *G. rivale*, growing in moister situations, has tonic and stimulating properties. The former species is widely spread, and has imparipinnate leaves and erect yellow flowers; whilst the latter has larger, drooping, purplish flowers, and hairier leaves. Not infrequently the two species are found in close proximity to each other, and then there are usually found intermediate forms, which some have classed as a third species (*G. intermedium*).

AVIENUS, Rufus Festus, a Latin descriptive poet, who flourished about the end of the fourth century after Christ, and wrote Descriptio Orbis Terræ, a general description of the earth; Ora Maritima, an account of the Mediterranean coasts, &c. His work shows some energy of style, but it reproduces many of the errors of his predecessors, and is besides spoiled by the extravagances into which his desire for effect often leads him. The more exact geographical knowledge of his time is not incorporated in his works.

AVILA, a town of Spain, capital of the province of Avila, a modern division of Old Castile. It is the see of the Bishop suffragan of Santiago, with a fine cathedral. Once it was one of the richest towns in Spain. The principal employment in the town is spinning; in the province, the breeding of sheep and cattle. Pop. (1897), town, 11,712; province, 200,457.

AVLONA, a seaport of Turkish Albania, on the Adriatic, with a considerable trade in oil, wool, salt, pitch, tar, valonia, and tortoises. It is the seat of a Greek archbishop. The Italians call it Valona, whence is derived the name of the tanning material *valonia* (which see). Pop. 6000.

AVOCA, or Ovoca (Celtic, the meeting of the waters), a valley and river of Ireland, in the county of Wicklow, celebrated as the scene and subject of one of Moore's Irish Melodies. The river is formed by the confluence of the Avonbeg and Avonmore, and below their union receives the Aughrim. It traverses the parish of Arklow, and after a course of about 9 miles falls into the sea about a mile below the town of that name. The scenery of the vale of Avoca is very beautiful, being richly wooded and varied by height and hollow, and it attracts many visitors.

AVOCADO PEAR. See Laurel.

AVOCET, a bird of the order Grallatores. The only European species (*Recurvirostra avocetta*) is about 18 inches long, has long legs with palmated feet, much more adapted for walking than swimming, and a very singular bill, about 3½ inches long, curving upwards in a manner which is admirably adapted to enable the bird to probe and scoop up the water and mud of the oozy shores and estuaries which are its usual haunts. Its body is black and white, and its legs naked and of a fine blue colour. It is widely spread in the temperate climates of Europe, Asia, and Africa. It was once common in various marshy parts of England, and still breeds in the fens of Lincoln and Norfolk, building in spring a very inartificial nest, in which the female lays two eggs of a greenish colour, spotted brown or black. It employs devices like those of the lapwing and certain other birds to decoy the intruder from its nest.

AVOLA, a seaport on the east of Sicily, some 13 miles to the south-west of Syracuse, with a trade in wine, almonds, sugar, &c. Pop. 13,000.

AXE-STONE, a mineral, a variety of nephrite or jade, used by the natives of New Zealand and the South Pacific Islands for axes, &c. See Jade.

AXHOLME ISLE, a sort of island in England formed by the rivers Trent, Idle, and Don, in the north-west angle of Lincolnshire, 17 miles long, 4½ broad. It was anciently covered by a forest, and for many years it was simply an extensive marsh; now it is a fertile district. Seven parishes, including Epworth, where the Wesleys were born, are comprised in it.

AXIL, Axilla, in botany, the angle between the upper side of a leaf and the stem or branch from which it springs. Buds usually appear in the axils, and flowers or flower-stalks growing in this way are called *axillary*.

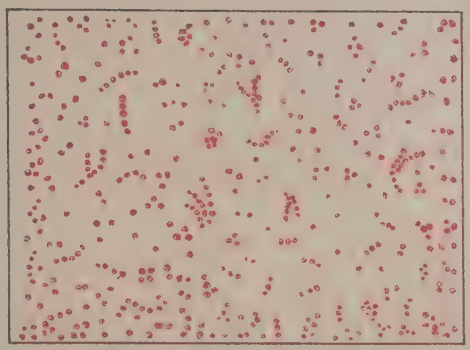
AXIS, in botany, the central part of higher plants, from which spring the various lateral appendages, such as leaves, flowers, and branches. The upper or ascending axis is called the stem, whilst the lower or descending axis constitutes the root; between these two there are several fundamental differences. Plants, such as algæ and fungi, which do not show this differentiation into axis and appendages are called *thallophytes*, because the plant-body consists of a more or less uniform and simple *thallus*; the other plants are sometimes known as *cormophytes* or *stem-plants*. We also speak of the axis of a flower, by which is meant the central portion on which the various whorls of floral organs are arranged; of the axis of an inflorescence, &c.; but these axes have generally special names restricted to them, as *receptacle, torus, thalamus, rachis*, &c.

AXIS (*Cervus axis*), a species of Indian deer, also known as the spotted deer, of a rich fawn colour, nearly black along the back, with white spots, and the under parts white. It varies considerably in size, but is commonly about 3 feet high at the withers. It has rather large three-tined antlers, and is altogether a handsome animal. It frequents trees and bushes, and is often met with in herds of considerable size. It is shy and retiring, and furnishes good sport. The axis breeds freely in many parks in Europe.

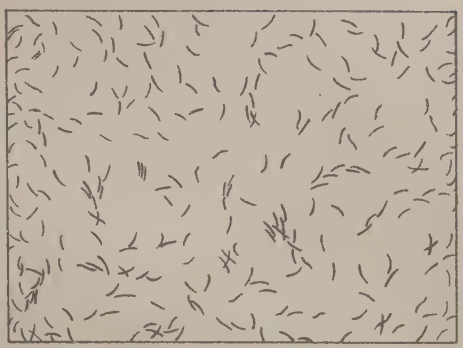
AYMARAS, an Indian race of Bolivia and Peru, speaking a language akin to that of the Quichuas, whom they resemble in many ways. They are hard-working, fanatical and superstitious, and were probably at one time a highly civilized nation.

AZALEA, a genus of plants belonging to the natural order Ericaceæ (or heaths), and the tribe of the Rhododendreæ, in which the fruit is septicidal, and the buds scaly, resembling cones. The members of the genus are shrubs with deciduous leaves and a profusion of sweet-scented flowers displaying a great

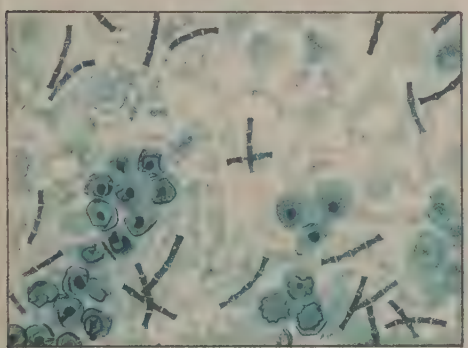
BACTERIA (magnified).



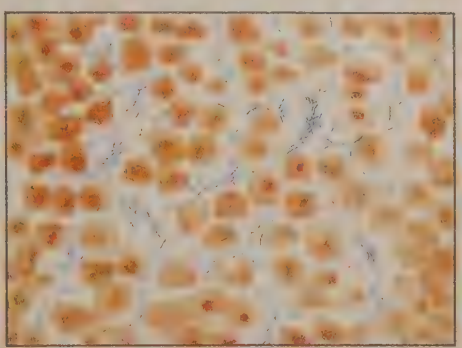
1, Micrococci from drinking-water (750:1).



2, Bacilli from drinking-water (750:1).

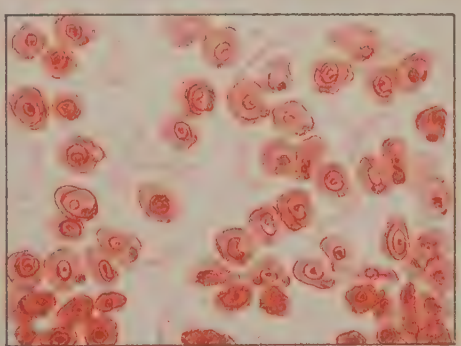


3, Bacilli from the Blood in splenic fever (500:1).



4, Koch's Tubercle Bacilli in expectoration (1000:1

5, Koch's Cholera Bacilli (1000:1).



6, Spirilli from the Blood in recurrent fevers (750:1).

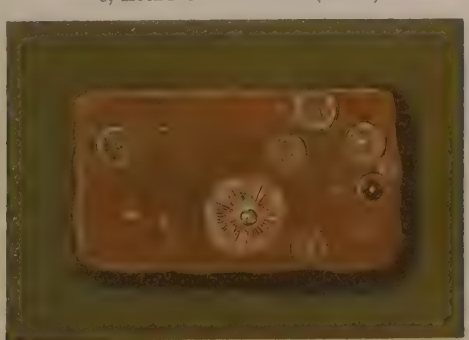


Fig. 7.

Fig. 8.

7, 8, Bacteria from relatively good and relatively bad drinking-water developed on gelatine plate.

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variety of brilliant colours. There are several species, some natives of America, others of India. The Indian azalea is rather delicate in the climate of Britain, but thrives well in pots of sandy peat earth in the greenhouse. Young cuttings taken off close to the plant and placed in pots of sand will root readily in a hot-bed under a bell-glass. The American species are more hardy, and thrive well in the open air in a soil of peat or sand, or, when this cannot be obtained, a mixture of leaf-mould and sand free from any mixture of animal manure. The principal species are *A. viscosa*, *A. nudiflora*, *A. speciosa*, *A. calendulacea*, *A. pontica*. The varieties are exceedingly numerous, presenting every shade of red, white, and yellow, as well as a great diversity of markings. The 'poisonous honey' mentioned by Xenophon in the Anabasis is supposed to have been a product of the *Azalea pontica*, which is now common in gardens and shrubberies.

AZAMGARH, a town of India, in the United Provinces, 80 miles north of Benares, capital of a district of the same name. It is a local centre for trade mostly in cotton and opium. Pop. (1901), 18,835.

AZOTE. See NITROGEN.

AZUL, a town of the Argentine Republic, in the province of Buenos Aires, connected by railway with the capital, in a cattle-rearing district. Pop. 8000.

AZULEJOS, enamelled tiles for covering walls and floors, originally made by the Arabs of Spain, and afterwards by the Spaniards. They were so called from their blue colour (Arabic *azul*, blue), but subsequently various colours and gilding were employed in their ornamentation. In the azulejos Moorish ornamental art exhibited its highest charm of line and colour. Azulejos are still made in Spain and Portugal, and the fronts of houses are sometimes covered with them.

AZURINE (*Leuciscus cæruleus*), a fresh-water fish of the same genus as the roach, chub, and minnow, found in some parts of Europe, but rare in Britain. It is called also *Blue Roach*.

B.

BACCARAT, a town of France, in the department of Meurthe-et-Moselle, on the river Meurthe, with a handsome new church, and one of the largest manufactories of plate-glass and crystal in France. Pop. (1901), 6609.

BACCARAT, a gambling game of French origin, played by any number of players, or rather bettors, and a banker, with one or more packs of cards. The latter deals two cards to each player, and two to himself, and covers the stakes of each with an equal sum. The cards are then examined, and according to the scores made the players take their own stake and the banker's, or the latter takes all or a certain number of the stakes.

BACHELORS' BUTTONS, the name popularly used for the well-known double-flowered varieties of various species of buttercup. The white species is derived from *Ranunculus aconitifolius*, and the yellow from the common *R. acris*. The same name is given to doubled varieties of the red campion (*Lychnis diurna*) and the knapweed (*Centaurea nigra*), plants belonging to quite distinct orders.

BACHMUT, a town of southern Russia, in the government of Ekaterinoslav, with a trade in cattle, tallow, &c., and coal and rock-salt mines. Pop. (1892), 17,211.

BACNINH, a town of Tonquin, capital of one of the five administrative divisions of the country, situated north-east of Hanoi, on the road to Langson and China. As the meeting-place of several roads it is strategically important and is fortified, having a strong citadel and a garrison of 2000 men. It was occupied by the French in 1884. Pop. 7000.

BACTERIA (Gr. *baktērion*, a little rod or staff), a class of very minute microscopic organisms or microbes which are regarded as of vegetable nature, and as being the cause or accompaniment of various diseases, as well as of putrefaction, fermentation, and certain other phenomena. Some of the better known of these organisms are so exceedingly minute, that under the highest power of improved microscopes, which magnify about 4000 times, they appear no larger than the periods and commas of ordinary type. Others are believed to be too small to be detected by any of our microscopes. Various classifications have been proposed for them, for they differ largely in size, form, and mode of multiplication. There is the *Micrococcus*, which is round and no larger than the 32,000th of an inch; the *Bacterium* proper, which is rod-shaped and about a 10,000th part of an inch; the *Bacillus* is a little larger than the latter and also rod-shaped (but the term 'bacillus' is also used in a general sense); while the *Spirillum* is of a wavy form. In one thing, however, they all agree. They all consist of a kind of protoplasm (a jelly-like substance resembling white of egg) inclosed by a colourless or coloured membrane, which may consist of cellulose or other material, and as organs of locomotion they possess the fine filaments known as cilia. Their reproduction is secured either by a dividing process (fission), in which the organism breaks in the middle, each part becoming an independent microbe; or by the formation of spores, which, when sufficiently nourished, become liberated and develop into forms similar to the adults. They are all regarded as in some respects similar to fungi, being destitute of chlorophyll, while they cannot exist upon inorganic matters alone, but are either parasitic upon living organisms or derive their nutriment from dead or decaying organic substances. It is only in quite recent times that the science of bacteriology has come into existence, and while much useful knowledge of these micro-organisms has been acquired, much still remains to be learned regarding them. It has been found that the action and life-history of some of them are associated with serious diseases, such as diphtheria, tuberculosis, cholera, anthrax, erysipelas, tetanus, &c., each disease having its special bacillus; but others again are highly beneficial in the work they perform, as those that exist in abundance in many soils, and that carry on the process of nitrification, and so furnish nitrogen in a form in which it may be taken up by plants. For scientific purposes and experiment it is now common to cultivate bacteria artificially in some fluid, especially a gelatinous fluid, or in some more or less solid matter, in which they can live and multiply. Most species of bacteria require air for their development, while others are destroyed by it. Heat also destroys bacteria, and by this means a fluid may be 'sterilized', that is, the bacteria or germs in it may be killed. Bacteria are extremely numerous as regards kinds or species, and are found almost everywhere—in air, soil, and

water, in foods and beverages, on man and animals, both externally and internally; and it is often very difficult to distinguish one of these microbes from another. It has been pointed out (by Prof. Frankland) as 'a striking and significant fact, that in the case of almost any micro-organism which has received special attention on account of some particular property which it possesses, *e.g.* pathogenic power, a careful examination of the natural habitat of such an organism has almost invariably led to the discovery of one and often many other bacteria resembling the particular one in question in almost every respect, but differing in one or more details'. Thus there has been discovered in the soil a bacillus so similar to the anthrax bacillus (which itself is often found in the soil) as to be indistinguishable from it in all save its pathogenic properties; and the relationship of the two is indeed so close that rabbits and mice when inoculated by the soil bacillus are protected against subsequent inoculation with virulent anthrax. There is also an innocuous parallel form to the diphtheria bacillus, found, like it, on the mucous membrane of the throat. Harmless bacilli almost indistinguishable from the cholera bacillus of Koch have also been found, like it, in the human intestine and in natural waters; and the same is the case in regard to the typhoid bacillus. Since the earlier researches of Pasteur, Lister, Burdon Sanderson, and Tyndall, the importance of the study of bacteriology has been generally recognized, and is actively carried on either in special laboratories or in laboratories connected with universities and other educational institutions. The bearings of bacteriology as regards air, water, soil, food, disinfection, sewage-disposal, and the maintenance of public health have led municipal authorities to take up the subject, and special bacteriologists for towns have in some cases been appointed. The necessity of having a supply of pure drinking-water is apparent to all, and in regard to this subject it may be noted that sand filtration is of the highest efficacy in removing these micro-organisms from water. Another fact that may be mentioned, and that has a direct bearing on the subject of disinfection, is the disinfecting or bactericidal action of sunlight, independent of any increase of temperature—a discovery dating from about 1877. Apart from questions bearing on the health of communities and individuals, the study of bacteriology has been of value to farmers and owners of live stock, as pointing out the origin of various animal diseases, and furnishing remedies for them, while the discoveries made in regard to the bacteria in soils and their action in preparing nitrogenous food for plants are of far-reaching influence. Besides pure yeasts, various bacterial preparations now enter into commerce, such as anti-toxic serum, and mixtures to be applied to sterile soils. For further information see GERM THEORY in SUPP., also ANTI-TOXIN, FERMENTATION, NITRIFICATION, &c.

BACUP, a municipal borough of England, in Lancashire, 18 miles north from Manchester. There are a number of churches, chapels, and schools, a mechanics' institute, court-house, market-hall, large co-operative stores, &c. The chief manufacturing establishments are connected with cotton spinning and power-loom weaving; there are also iron and brass foundries and machine-shops, dye-works, &c., and in the neighbourhood coal-pits and vast stone quarries. Its charter of incorporation was granted in 1882. Pop. (1881), 25,034; (1901), 22,505.

BADAGRY, a British seaport of West Africa, in the colony of Lagos, about 40 miles west of Lagos. Pop. 10,000.

BADAKHSHAN, a district of Central Asia, belonging to Afghanistan, bounded on the north and east by the river Oxus, on the south by the Hindu Kush range, west by Kunduz. Its length from east to west is about 200 miles, breadth from north to south about 150 miles. It is a mountainous country, abounding in mineral, vegetable, and animal resources, interspersed with romantic dales, long, narrow, rich, and fertile valleys, producing the choicest kinds of grain and fruits, with hills covered with the softest grass, affording pasture to yaks, oxen, the shawl-wool goat, the ibex, fat-tailed sheep, ponies, and camels. The principal town is Faizabad. The population are Mohammedans.

BADALONA, a town of Spain, in the province of Barcelona, and on the coast of the Mediterranean. It is a place of some trade and has various industries, including sugar-refining, glass-making, and ship-building. Pop. (1887), 15,974; (1897), 18,075.

BADMINTON, a game closely resembling lawn-tennis, but played with battledore and shuttlecock instead of ball and racket. It may be played outside or in a hall, the area or court required being 44 feet long by 20 wide. There are usually one or two players on a side, sometimes three or four. A point is scored when the opposite party fails to return the shuttlecock sent by the player or server. The game is named after a seat of the Duke of Beaufort in Gloucestershire.

BAFULABE, a town in the French Sudan, at the junction of two head-streams of the Senegal, connected by railway with Kayes on that river.

BAGAMOYO, a seaport of German East Africa opposite Zanzibar, and north of Dar-es-Salaam. Though it has no harbour, and its coast is often swept by hurricanes, it has a considerable trade in ivory, copra, caoutchouc, &c. The town has narrow streets, and the houses are generally mean. It has a fort, government house, custom-house, post-office and telegraph building, station of the German East African Association, government school, &c. It is unhealthy for Europeans. Pop. (1898), 17,953.

BAGATELLE, a game played on a flat oblong board, covered with cloth like a billiard board, with balls like small billiard balls, and a cue or mace. Bagatelle boards are of different sizes; a common size is 7 feet long by 21 inches broad. A raised edge prevents the balls from falling off, and at one end of the board this edge passes in a semicircle from side to side. At this end of the board are nine hollows or sockets of just sufficient size to receive the balls. These sockets are arranged in the form of a regular octagon, with the ninth in the middle, and are numbered consecutively from one upwards. Nine balls are used, one black, four white, and four red, the distinction between white and red being made only for the sake of variety. The cue with which the balls are struck resembles that used in billiards, and is used in the same way as in that game. The mace, which is generally reserved for ladies, has a triangular piece of wood at the end, with the broad flat base of which the ball is struck. At starting, the black ball is placed on a point in the longitudinal middle line of the board a few inches in front of the nearest of the sockets, and the player places one of his eight balls on a corresponding point at the other end of the board, or at any part of the board within a line drawn transversely across the board at that point, and tries to strike the black ball with his own. After that, his object is to place as many as possible of the balls in the sockets. Each ball so placed counts as many as the socket is numbered for, and the black ball always counts double. If the player misses the black ball in his first stroke his ball is lifted off the table, and he does not count until the black ball has been struck by him. A ball that has been socketed and again struck out does not

count. When the first player has played all his balls his score is counted and an opposition player proceeds in the same way to play his eight balls.

BAGEHOT, WALTER, English economist and journalist, was born at Langport, Somerset, on February 3, 1826. He entered University College, London, in 1842, and after gaining great distinction in mathematics and philosophy, he took the degree of M.A. in 1848. Four years later he was called to the bar, but instead of practising he went into business. He was one of the editors of the National Review (1855–64), and from 1860 till his death he was editor and part proprietor of the Economist. His chief works are The English Constitution (1867); Physics and Politics (1872), 'an attempt to apply the principles of natural selection and inheritance to political society'; Lombard Street (1873), a study of the money market; and Literary, Biographical, and Economic Studies (1878–80). He died at his native place on March 24, 1877.

BAGIMONT'S ROLL, a rent-roll of Scotland, made up in 1275 by *Baiamund* or *Boiamond* de Vicci, vulgarly called *Bagimont*, who was sent from Rome by the pope, in the reign of Alexander III., to collect the tithe of all the church livings in Scotland for an expedition to the Holy Land. It remained the statutory valuation, according to which the benefices were taxed, till the Reformation. A copy of it as it existed in the reign of James V. is in the Advocates' Library, Edinburgh.

BAGIRMI, a Mohammedan negro state in Central Africa, is situated partly between Bornu and Wadai, to the south-east of Lake Tchad, and is watered by the Shari, which falls into Lake Tchad, and by its tributaries. It has an area of about 65,000 square miles, and about 1,500,000 inhabitants; but both its area and population fluctuate according as it encroaches on or is encroached on by its neighbours. The whole country is a plain 900 feet above the level of the sea, well suited for the cultivation of sorghum, which is accordingly the principal breadstuff. Sesame, beans, cotton, and indigo are also cultivated. The government is an absolute monarchy, but the ruler pays tribute to Wadai. Bagirmi was formerly included in one state with Bornu and Wadai. Dr. Barth visited Bagirmi in 1852, and Nachtigal visited the country twenty years later. Mizon entered it from the Congo basin in 1893. An inexhaustible supply of slaves is found in the heathen negro states to the south, at the expense of whom also Bagirmi, when pressed by its Mohammedan neighbours, extends its territory. The capital is Masena, situated about the centre of the state. By Britain and Germany Bagirmi has latterly been recognized as within the French sphere of influence, and in 1897 a treaty was concluded between the French government and the sultan. There is a French resident in the capital.

BAHAWALPUR, a town of India, capital of a state of the same name in the Punjab, 2 miles from the Sutlej. It is surrounded by a mud wall and contains the extensive palace of the Nawab, a vast square pile with towers at the corners. It has underground rooms, which afford a more comfortable temperature in the warm season than the upper rooms. Silk goods are manufactured. Pop. (1901), 18,700.—The state has an area of 17,285 square miles, of which 10,000 is desert, the only cultivated lands lying along the Indus and Sutlej. Cultivation largely depends upon irrigation, which has been considerably extended in recent times, with a great increase to the state revenue. The chief crops are cereals, cotton, and indigo. The political relations between the British government and the state are regulated by a treaty concluded in 1838. No tribute is exacted from the Nawab. Pop. (1901), 720,662.

BAHRAICH, a town of Hindustan, administrative head-quarters of Bahraich district, Faizabad division, Oudh. The town is in a flourishing state; it is drained and lighted, and carries on a good local trade. The chief edifice of interest is the shrine of Musand, a warrior and saint of the eleventh century, which attracts both Hindu and Mohammedan pilgrims to the number of 150,000 annually. The American Methodist mission has a station and a school here. Pop. (1891), 24,046; (1901), 27,304.

BAHREIN, or AVAL ISLANDS, a group of islands in a bay on the south side of the Persian Gulf, since 1867 under British protection. The principal island, usually called Bahrein, is about 27 miles in length and 10 in breadth. It is in general very flat and low, a mere shoal hardly 20 feet above sea-level; though in the centre there are hills 400 feet high. The soil is not fertile, except in some places, and is often cultivated by means of irrigation. Excellent dates are produced. Fishing is an important industry, and the pearl-fishery here is famous. The inhabitants are a mixed race. The principal town is Manameh or Manama; pop. 25,000. The island of Moharrek, separated from Bahrein by a strait 2 miles broad and only about 3 feet deep at ebb, is much smaller than it; but contains a town called also Moharrek, which is the present seat of government, and has a population of 22,000. The islands are governed by a sheikh. The total population is estimated at 70,000.

BAHR-EL-GHAZAL, a large river of Central Africa, a western tributary of the Nile. It is formed by the union of several streams flowing north-east from the Congo-Nile divide and the Bahr-el-Arab flowing east from the Marrah mountains. It flows eastwards through a very swampy region, and shortly after leaving Lake No unites with the Bahr-el-Jebel to form the White Nile. Its banks are apt to be very indefinite owing to inundations. In 1869 Schweinfurth explored the greater part of its basin. The head of steam navigation on the river is Meshra-er-Rek. The river gives name to a province in which a settled government was established on behalf of Egypt in 1878, but the Mahdist rebellion temporarily severed its connection with that country. Since the reconquest of the Egyptian Soudan by the British and Egyptian forces under Kitchener, however, the Bahr-el-Ghazal has been again brought under a settled administration. It is said to be rich in ivory, rubber, and timber, and suited for cotton growing. The Ubangi district of the French Congo lies to the west of the Bahr-el-Ghazal.

BAIDYABATI, a town of Bengal, on the river Hugli, about 15 miles from Calcutta, with an important market for jute and other produce. Rope made of jute and hemp is manufactured, and at Champdani, east of the town, there is a jute mill that employs 3000 hands. Pop. (1901), 17,174.

BAIGAS, a small but interesting Dravidian tribe in the Central Provinces of India, akin to the Gonds, and residing principally in Mandla and the adjoining districts. They number about 25,000 individuals, and have several tribal divisions or subcastes, subdivided into septs or other sections. Both endogamy and exogamy are exemplified in these divisions, that is the members of some must marry within their own division, those of others must marry outside of it. They are much employed as woodcutters, make mats and baskets for sale, and are skilful hunters.

BAILDON, an urban district in the W. Riding of Yorkshire, about 5 miles north of Bradford, with worsted manufactures, chemical works, and quarries. Pop. (1901), 5797.

BAILEY, Philip James, poet, born at Nottingham on April 22nd, 1816, and educated first in his native city and afterwards at Glasgow University, was called to the bar at the age of twenty-four, but never practised. His best-known poem, Festus, was first published in 1839, and has passed through a very large number of editions both in Britain and the United States. It is a dramatic poem, interspersed with songs, and the characters, both mortal and immortal, are very numerous. Its aim is to exhibit the history of a gifted soul passing through struggle and defeat to peace and victory; and the execution has won the admiration of many notable authors and critics. He is author of a few other poems and of one prose work; amongst the former are The Age (1858), and The Angel World (1850), now incorporated with Festus. He died on Sept. 6, 1902.

BAILIE, Baillie, a municipal officer or magistrate in Scotland, corresponding to an *alderman* in England. The criminal jurisdiction of the provost and bailies of royal burghs extends to breaches of the peace, drunkenness, adulteration of articles of diet, thefts not of an aggravated character, and other offences of a less serious nature. English aldermen sit and vóte in their councils *ex officio*, although elected in the first instance by the ratepayers; but Scottish bailies sit and voté, like the other members, as representatives, and are subject to the ordinary rules of retirement.

BAILLEUL, an ancient French town, in the department of the Nord, near the Belgian frontier, about 19 miles west of Lille. It has manufactures of woollen and cotton stuffs, lace, leather, &c. Pop. (1906), 9205.—A village of the same name in the department of Orne gave its name to the Baliol family.

BAILLIESTON, a town of Scotland, in Lanarkshire, about midway between Glasgow and Airdrie. It stands in a district rich in coal, and many of its inhabitants are employed in the coal-mines. Pop. (1891), 3636; (1901), 3784.

BAILY, Edward Hodges, an English sculptor, was born at Bristol on Mar. 10th, 1788. He was the son of a ship-carver, and was brought up with a view to a mercantile career; but ere long he gained considerable success as a modeller in wax. He became a pupil of Flaxman in 1807, gained the Academy gold medal in 1811 for his Hercules Restoring Alcestis to Admetus, and was elected R.A. in 1821. His principal works are Eve at the Fountain; Eve Listening to the Voice; Maternal Affection; Girl Preparing for the Bath; The Graces; &c. The basreliefs on the south side of the Marble Arch, Hyde Park, the statue of Nelson on the Trafalgar Square monument, and many statues of distinguished men, were executed by him. In 1863 he was placed on the honorary retired list of the Royal Academy, and on May 22nd, 1867, he died at London.

BAIN, Alexander, LL.D., a distinguished writer on mental science and allied subjects, was born at Aberdeen in 1818, and was educated at Marischal College and University there. Graduating in 1840, he became deputy-teacher of the moral philosophy and natural philosophy classes in Marischal College. Between 1845 and 1860 he was in succession a professor at the Andersonian College, Glasgow, assistant secretary to the metropolitan sanitary committee and the general board of health, and examiner in mental and moral science in the University of London, and for the India civil service examinations. From 1860 till 1880 he occupied the chair of logic and English in the University of Aberdeen (formed by the union of the two universities of Marischal College and of King's College), and he was twice elected its rector. He died September 18, 1903. Besides an autobiography he is the author of numerous works on mental and moral philosophy, the two most important being The Senses and the Intellect (1855), and The Emotions and the Will (1859). These contain a comprehensive examination of mental phenomena from the stand-point of the experiential school, and they have run through several editions. Edinburgh University marked its sense of the importance of his work by conferring on him the honorary degree of LL.D. in 1859. Amongst his other works on similar subjects are The Study of Character (1861); Mental and Moral Science (1868); John Stuart Mill, a Criticism, with Personal Recollections (1882); and Logic, Deductive and Inductive (1870). He has also written a Higher English Grammar (1863); Manual of English Composition and Rhetoric (1866); Education as a Science (1879); &c. In 1887 the first, and in 1888 the second part of a revised and enlarged edition of the Rhetoric were produced.

BAKER, Sir Samuel White, a distinguished English traveller, was born in London on June 8, 1821. He was trained as an engineer, and at the age of twenty-four he went to Ceylon, where he founded an agricultural settlement at Nuwara Eliya in 1847. Having returned to Europe he assisted in the construction of a railway from the Danube across the Dobrudsha to the Black Sea. In the early part of 1861, accompanied by his (second) wife, a young Hungarian lady whom he had married in the preceding year, he set out for Africa on a journey of exploration. When he had ascended the Nile as far as Gondokoro he met Speke and Grant returning after their discovery of the Victoria Nyanza lake, and learnt from them that another large lake in the district had been spoken of by the natives. This lake he determined to discover, and after many adventures he and his wife beheld the Albert Nyanza from a height on March 14th, 1864. On his return home he was received with great honour and was knighted. In 1869 he returned to Africa as head of an expedition sent by the Khedive of Egypt to suppress the slave-trade and to annex and open up to trade a large part of the newly explored country, being raised to the dignity of pasha. He returned home in 1873, having finished his work, and was succeeded by the celebrated Gordon. In 1879 he explored the island of Cyprus, and subsequently he travelled much in Asia and America. He was a fellow of the Royal Society, and received many decorations both at home and abroad. He died Dec. 30, 1893. His writings include: The Rifle and the Hound in Ceylon (1854); Eight Years' Wanderings in Ceylon (1855); The Albert Nyanza (1866); The Nile Tributaries of Abyssinia (1867); Ismailia, a Narrative of the Expedition to Central Africa (1874); Cyprus as I saw it in 1879; Wild Beasts and Their Ways (1890); also, Cast up by the Sea, a story published in 1869. See the Life by Murray and White (1895).